

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.



aSB249
.N35



NATIONAL COTTON RESEARCH

JUNE, 1976

**United States
Department of
Agriculture**



National Agricultural Library

a 5 B249
. N35

NATIONAL COTTON RESEARCH

A REPORT ON
COTTON
RESEARCH NEEDS

PREPARED BY

NATIONAL
COTTON RESEARCH
COORDINATING
COMMITTEE

JUNE, 1976

U.S. DEPARTMENT OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY

OCT 15 1996

CATALOGING PREP.

FOREWORD

The National Cotton Research Coordinating Committee was implemented in September, 1971. Its main purpose is to provide an oversight mechanism for reviewing cotton research needs at the State Agricultural Experiment Stations, within the U. S. Department of Agriculture and by Cotton Incorporated.

Membership consists of State Agricultural Experiment Station Directors, Administrators, and program leaders within the Department of Agriculture and Research Directors of Cotton Incorporated.

During the fall of 1975, the Committee made the decision to do an indepth study of cotton research needs. Nine subject-matter areas were identified, with members of the parent committee serving as chairmen of the subgroups. Other members were cotton research scientists working in their respective disciplines. This report is a compilation of their studies. Although a general format was agreed upon, no attempt was made to standardize the writing. Thus, the length and style of individual chapters reflects the personality and composition of the subcommittees.

This report is intended for the administrators and other decision makers within the cotton community, public and private, with the hope that it will be of assistance to them in making future resource allocations for cotton research. Extra copies, as long as available, may be obtained from the chairman of the Committee.

Alvin Deck, from the Agricultural Marketing Service, served an important liaison role between the Department of Agriculture, Cotton Incorporated, and the Committee.

TABLE OF CONTENTS

	<u>PAGE</u>
INSECTS - - - - -	1
DISEASES - - - - -	19
WEEDS - - - - -	34
MECHANIZATION - - - - -	43
IMPROVEMENT - - - - -	51
POLLUTION - - - - -	61
MARKETING AND ECONOMICS - - - - -	67
COTTON UTILIZATION - - - - -	96
COTTONSEED UTILIZATION - - - - -	111

MEMBERSHIP

Agricultural Experiment Stations

M. A. Massengale - Arizona
 L. O. Warren - Arkansas
 J. S. Roussel - Louisiana
 W. K. Porter - Mississippi
 J. E. Halpin - Director-at-Large,
 Southern Region

Cotton Incorporated

Hal Brockmann
 George Slater

National Cotton Council

J. Ritchie Smith

U. S. Department of Agriculture

Agricultural Research Service

N. F. Getchell
 J. B. Pate
 Mary E. Carter

Economic Research Service

P. E. Leferney

Extension Service

J. E. Jernigan
 R. C. Scott

Cooperative State Research Service

R. L. Lovvorn, Chairman

Cotton Insects Subcommittee Report
to
National Cotton Research Coordinating Committee

An updating of cotton research was determined to be necessary at the October 1975 meeting of the Cotton Coordinating Committee. Subcommittees were appointed by the Chairman of the Committee to accomplish this Task Force revision.

General circulation was made of the 1973 National Cotton Research Task Force section on Cotton Insects with requests for suggestions. A subgroup met in New Orleans in December for consideration of suggestions received. This meeting resulted in a revision of the Cotton Insects section as reported to the National Cotton Coordinating Committee at the January meeting. The report has since been modified to conform with the Committee's request to adjust report to format developed at the January meeting.

Considering the seriousness of current cotton insect problems, the dynamics of pest species, the dependency on insecticide applications for effective control, insecticide costs, and the development of resistance of cotton pests to insecticides, the committee felt that the long-range research needs were as follows:

a. Intensify emphasis on plant breeding to develop varieties conferring resistance to pest species of cotton, especially Heliothis spp. and the boll weevil. Environmental constraints, and the development of resistance in insect pests to insecticides, indicate that in the future, cotton producers should rely less heavily upon insecticides. Resistance in cotton to one or more of its pests would result in reduced costs, a decrease in the number of applications of insecticides and a probable increase in the length of the effective use period for currently recommended insecticides.

b. From existing or new technology, develop for each of the regions in the cotton belt an effective pest management program which maximizes benefits from insecticides used and makes use of other new technology when it can be effectively applied.

c. Continue research in support of the proposed trial boll weevil eradication program in North Carolina and Virginia. Mass rearing and sterilization of the boll weevil represents the highest priority research for the proposed trial program.

d. Develop new methods of autocidal control for the pink bollworm and the tobacco budworm-bollworm complex.

e. Continue efforts to develop and obtain data to register new promising candidate insecticides with special emphasis on the tobacco budworm problem.

Membership

Members of the subcommittee working on the cotton insect report included:

Dr. T. F. Leigh - University of California - Davis
Dr. J. R. Phillips - University of Arkansas - Fayetteville
Dr. E. P. Lloyd - U. S. Department of Agriculture - Stoneville
Dr. T. F. Watson - U. S. Department of Agriculture, Cooperative
State Research Service, Washington, D. C.
Dr. J. S. Roussel - Louisiana State University - Baton Rouge
(Chairman)

SUMMARY OF FUNDING AND SY'S

	ARS	SAES	Total
Boll Weevil			
Financial	2,062,909	782,080	2,844,989
SY's	28.2	15.1	43.3
Bollworm			
Financial	1,879,155	1,408,924	3,288,079
SY's	21.0	18.0	39.0
Pink Bollworm			
Financial	1,076,628	636,286	1,712,914
SY's	12.9	6.0	18.9
Plant Bugs			
Financial	169,085	433,582	602,667
SY's	1.9	4.9	6.8
Minor Pests			
Financial	124,595	286,417	411,012
SY's	2.1	4.0	6.1
Grand Total	5,312,372	3,547,289	8,859,661
	66.1	48.0	114.1

SUMMARY

<u>Priority</u>	<u>Title</u>	<u>Project</u>	<u>Additional SY's Accumulation</u>
<u>1 / 14</u>	Development of Cotton Strains Conferring Resistance to the Boll Weevil	<u>2.0</u>	<u>2.0</u>
<u>1 / 14</u>	Identify Pink Bollworm Resistant Germplasm and Develop Cotton Varieties for Utilization in Pest Management Programs	<u>2.0</u>	<u>4.0</u>
<u>1 / 14</u>	Intensify Research to Identify and Develop Germplasm in Cotton Conferring Resistance in Cotton Cultivars to the Bollworm Complex, <u>Heliothis</u> spp.	<u>2.0</u>	<u>6.0</u>
<u>2 / 14</u>	Intensify Research in Autocidal Mechanisms for Boll Weevil Control	<u>0</u>	<u>6.0</u>
<u>2 / 14</u>	Research to Improve <u>Heliothis</u> spp. Population Management and Control	<u>0</u>	<u>6.0</u>
<u>2 / 14</u>	Intensify Research to Improve the Effectiveness of Boll Weevil Pest Management Programs	<u>0</u>	<u>6.0</u>
<u>3 / 14</u>	Improve Pink Bollworm Management by the Development and Integration of Control Techniques	<u>0</u>	<u>6.0</u>
<u>4 / 14</u>	Investigate Autocidal Methods for Control of the Pink Bollworm	<u>1.0</u>	<u>7.0</u>
<u>5 / 14</u>	Research on Autocidal Mechanisms for Control of the Bollworm Complex	<u>0</u>	<u>7.0</u>
<u>6 / 14</u>	Develop Greater Knowledge of the Biology and Behavior of the Boll Weevil	<u>0</u>	<u>7.0</u>
<u>7 / 14</u>	Intensify Study on Biology and Behavior of the Bollworm Complex	<u>0</u>	<u>7.0</u>
<u>8 / 14</u>	Investigate the Biology, Ecology, and Behavior of Pink Bollworm in Infested Western Areas	<u>0</u>	<u>7.0</u>
<u>9 / 14</u>	Improve Management of Plant Bugs that are Pests of Cotton	<u>1.0</u>	<u>8.0</u>
<u>10 / 14</u>	Management of Periodical Pests of Cotton Such as Spider Mites, Aphids, Cotton Leafperforators, Whiteflies, etc.	<u>0</u>	<u>8.0</u>

COTTON INSECTS 1976

Priority 1 / 14

SUBJECT: Development of Cotton Strains Conferring Resistance to the Boll Weevil

RPA: 207

JUSTIFICATION: Development of cotton strains with resistance or tolerance to the boll weevil would represent a major suppression component in future pest management programs. Limited effort is currently directed towards the identification, isolation, and transfer of genetic characters which confer resistance, tolerance, or escape mechanisms which reduce boll weevil damage. Varieties containing partial or high levels of resistance could result in a decreased need for insecticide treatments, enhance the effectiveness of required treatments, and extend the useful life of currently available insecticides.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	121,397			185,241		307,638
SY's	2.0			3.6		5.6

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.0 GRAND TOTAL 7.6

REMARKS: Research should be conducted in different environmental subregions of the cotton belt and be coordinated. A 5-year program is needed. Regional research project S-102 should facilitate coordination.

COTTON INSECTS 1976

Priority 1 / 14

SUBJECT: Identify Pink Bollworm Resistant Germplasm and Develop Cotton Varieties for Utilization in Pest Management Programs

RPA: 207

JUSTIFICATION: Host plant resistance is a major undeveloped tool for insect management. Until recent years very limited resources were allocated to the identification and utilization of resistance germplasm for insect population management. Reasonable progress was made in certain areas towards the development and use of such techniques. Limited effort is currently directed to the identification of pink bollworm resistant plant characters. An increased effort is warranted to speed the process of identification and development of such germplasm.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	57,591					57,591
SY's	.9					.9

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.0 GRAND TOTAL 2.9

REMARKS: Additional professional personnel are needed to enhance this program. Close coordination must exist between Entomologists, Cotton Geneticists and Plant Breeders to obtain maximum benefits for allocated funds.

COTTON INSECTS 1976

Priority 1 / 14

SUBJECT: Intensify Research to Identify and Develop Germplasm in Cotton
Conferring Resistance in Cotton Cultivars to the Bollworm Complex, Heliothis
spp.

RPA: 207

JUSTIFICATION: Both species, H. zea and H. virescens, developed resistance to commercially used insecticides in past years. Adequate control is not often possible, although producers following best known control methods can minimize losses. Cotton strains are currently available which confer some degree of resistance against attacks by Heliothis. The development of commercial varieties with resistance to H. spp. will greatly increase the effective management of the bollworm complex, reduce cotton losses, and probably lengthen the life span of candidate insecticides currently under development. An intensified cooperative research program between plant scientists and entomologists is urgently needed.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	343,960			309,630		635,590
SY's	3.8			4.0		7.8

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>2.0</u>	GRAND TOTAL	<u>9.8</u>
-----------------	------------	-------------	------------

REMARKS: Current efforts have identified characters useful in a host plant resistant breeding program. Coordinated efforts are rapidly improving breeding lines. An intensified program should bring this area of research to fruition within a reasonably short period of time.

A five year intensive program is essential.

COTTON INSECTS 1976

Priority 2 / 14

SUBJECT: Intensify Research in Autocidal Mechanisms for Boll Weevil Control

RPA: 207

JUSTIFICATION: The Trial Boll Weevil Eradication Program proposed for North Carolina and Virginia is dependent upon the integration of suppression methods including insecticidal control, pheromone trapping, and release of sterile insects. The development of mechanized procedures for mass rearing large numbers of insects for release as well as the development of reliable sterilization methods for both sexes are required before undertaking the proposed trial program.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	374,247					374,247
SY's	5.8					5.8

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0 GRAND TOTAL 5.8

REMARKS: Congress appropriated funds for expanded research on the boll weevil in Fiscal Year 1976. Part of these funds will be utilized for expanded research on mass rearing and sterilization of the boll weevil.

COTTON INSECTS 1976

Priority 2 / 14

SUBJECT: Research to Improve Heliothis spp. Population Management and Control

RPA: 207

JUSTIFICATION: Cotton producers throughout the cotton belt have met increasing difficulties in maintaining effective control of H. spp. Resistance to pesticides, loss of natural control agents, change in behavior patterns and other unidentified causes have contributed to the problem. Increased research efforts to improve management of the bollworm complex with the use of biological genetic modification of plant, and chemical agents as well as cultural practices are critical to the cotton industry.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	1,022,571			834,098		1,856,669
SY's	9.3			9.0		18.3

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0 GRAND TOTAL 18.3

REMARKS: Several new candidate biological and chemical agents showing promise for effective control of the H. complex have appeared in recent years. Development of methodology for use and data for registration will require extensive research efforts. A coordinated program between regions and industry is important to the ultimate development of these agents. Adequate personnel and funding to accomplish this task is available currently.

COTTON INSECTS 1976

Priority 2 / 14

SUBJECT: Intensify Research to Improve the Effectiveness of Boll Weevil Pest Management Programs

RPA: 207

JUSTIFICATION: The boll weevil remains the major cotton pest in most areas east of the High Plains of Texas. Pest Management for efficient cotton production requires effective control measures where economic thresholds are reached or suppression of the population before damaging numbers develop. Organophosphorus insecticides are currently the only group of insecticides to which the boll weevil has not developed resistance. Therefore, continued research is needed to develop improved methods (chemical, biological, etc.) for suppression or control of the boll weevil. Integration of a combination, of suppression measures into an effective pest management program is essential to the welfare of the cotton industry.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	920,805				484,373	1,405,178
SY's	11.8				7.5	19,3

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0</u>	GRAND TOTAL	<u>19.3</u>
-----------------	----------	-------------	-------------

REMARKS: Adequate resources are currently allocated to supporting an effective program or research in this extremely important area. Effective utilization of the resources should lead to the development of improved methodology for more effective management of the boll weevil problem. A coordinated regional research program is established and operating presently.

COTTON INSECTS 1976

Priority 3 / 14

SUBJECT: Improve Pink Bollworm Management by the Development and Integration of Control Techniques

RPA: 207

JUSTIFICATION: Pink bollworm control is essential to optimum cotton production in some regions of the western cotton area. The development of improved chemical, biological, and cultural control practices is necessary to efficient production. Gossyplure, the pink bollworm sex attractant, has been identified and synthesized, however, the techniques and approaches for using this important pheromone require substantial development. Chemical termination of cotton plant fruiting offers a real possibility in reducing overwintering populations. Full exploration of this finding and its integration into a pest management program is necessary to determine its full potential in a pink bollworm suppression program.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	743,023			556,286		1,229,309
SY's	8.3			4.0		12.3

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0</u>	GRAND TOTAL	<u>12.3</u>
-----------------	----------	-------------	-------------

REMARKS: The exploration of several new approaches to pink bollworm management is critical to cotton producers in the western area. A fully coordinated program is essential to the development of these new approaches.

Early irrigation termination resulting in cessation of cotton plant fruiting offers a real possibility in reducing overwintering population. Similar results have been achieved with chemical termination of cotton fruiting.

COTTON INSECTS 1976

Priority 4 / 14

SUBJECT: Investigate Autocidal Methods for Control of the Pink Bollworm

RPA: 207

JUSTIFICATION: Insect sterility and genetical control of pests offers interesting alternative methods for suppression. It is especially so on species of limited host plants such as the pink bollworm. Integration with other methods greatly enhances the possibility of successful suppression of pests species. Evidence to date shows that autocidal methods offer interesting possibilities for the pink bollworm.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	126,014					126,014
SY's	1.0					1.0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.0</u>	GRAND TOTAL	<u>2.0</u>
-----------------	------------	-------------	------------

REMARKS: Research efforts should be concentrated in Western cotton areas where this pest is a major problem.

COTTON INSECTS 1976

Priority 5 / 14

SUBJECT: Research on Autocidal Mechanisms for Control of the Bollworm Complex

RPA: 207

JUSTIFICATION: Control of the bollworm-tobacco budworm complex has become increasingly difficult in recent years. Laboratory research has indicated that a hybrid resulting from the mating of Heliothis subflexa and H. virescens when backcrossed to H. virescens produces fertile hybrid females and sterile hybrid males. Research is needed to determine behavior responses of wild H. virescens to the released hybrid moths. Other autocidal approaches must also be researched and developed. If successfully introduced into a wild population, the Heliothis hybrid could result in an effective autocidal control program for the tobacco budworm.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial						
SY's	2.0			1.0		3.0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0 GRAND TOTAL 3.0

REMARKS: Congress appropriated funds for Fiscal Year 1976 to study this approach. If preliminary field results of this research are encouraging additional support could be needed. Regional Research Project S-59 will coordinate the autocidal research on the bollworm and tobacco budworm. SY's indicated are program realignment from other areas of bollworm-tobacco budworm research.

COTTON INSECTS 1976

Priority 6 / 14

SUBJECT: Develop Greater Knowledge of the Biology and Behavior of the Boll Weevil

RPA: 207

JUSTIFICATION: A thorough knowledge of the biology, behavior, and population dynamics of boll weevils are essential for its efficient suppression and control. A better understanding of the factors responsible for initiation and termination of diapause, the response of this insect to its pheromone at different periods during the season, the effectiveness of different trap designs and trapping systems, and the emergence pattern of this insect from overwintering will enhance the effectiveness of existing as well as new control agents and control systems.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	646,460			112,466		758,926
SY's	8.6			4.0		12.6

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0 GRANT TOTAL 12.6

REMARKS: This insect could respond differently in the environmental subregions of the cotton belt. Concurrent research in subregions should be coordinated within the Regional Research Project S-102. Research has been expanded in this area by funds appropriated by Congress in Fiscal Year 1976. Greater efforts must be devoted to the study of diapause initiation and termination in the boll weevil.

COTTON INSECTS 1976

Priority 7 / 14

SUBJECT: Intensify Study on Biology and Behavior of the Bollworm Complex

RPA: 207

JUSTIFICATION: Control of the bollworm-tobacco budworm complex has become increasingly difficult in recent years. As a result of apparent changes in insect behavior patterns, an increased level of resistance to recommended insecticides, and the destruction of natural control organisms by insecticides, cotton producers in many areas have sustained substantial crop losses to this insect complex. Basic studies of the biology, behavior, migration, and interactions with alternate weed hosts and crops are essential to the development of effective management techniques for this pest complex.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	512,624			265,196		777,820
SY's	5.9			4.0		9.9

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0</u>	GRAND TOTAL	<u>9.9</u>
-----------------	----------	-------------	------------

REMARKS: Coordinated beltwide research is essential to the understanding of host plants and migratory habits of the two species. A better understanding of local host plant contribution to the problem is important to an analysis of the total problem. The study of bollworm-tobacco budworm migratory habit will require intensive research efforts and scientific manpower if and when undertaken. Reallocation of manpower and funds of present resources may be necessary when such an intensive study is undertaken. Regional Research Project S-59 has and is serving to coordinate research on the insect complex.

COTTON INSECTS 1976

Priority 8 / 14

SUBJECT: Investigate the Biology, Ecology, and Behavior of Pink Bollworm in
Interest Western Areas

RPA: 207

JUSTIFICATION: The pink bollworm is of major importance in the irrigated cotton-growing regions of the west. A better understanding of the biology, behavior, and season population development in the western area would greatly aid in the development of effective control measures. The integration of available control methods is dependent upon an understanding of the pink bollworm biology and development.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	150,000			80,000		230,000
SY's	2.7			2.0		4.7

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0 GRAND TOTAL 4.7

REMARKS: The objective of current program is to develop ecologically sound management systems. Research studies in the area of biology and ecology would add knowledge of this pest under a different environmental situation.

COTTON INSECTS 1976

Priority 9 / 14

SUBJECT: Improve Management of Plant Bugs that are Pests of Cotton

RPA. 207

JUSTIFICATION: Plant bugs periodically are serious pests of cotton. Generally, they attack the cotton plant at an early stage in the growth cycle. The use of available pesticides during this period often results in a serious upset of biological agents effective in Heliothis spp. management. Thus the timing of pesticide applications during this critical state of plant development is undesirable. Use of cotton varieties more tolerant to plant bugs and more specific insecticides which will lessen the impact on non-target organisms is important to the total pest management program. A better understanding of factors which result in these periodical outbreaks will aid materially in cotton pest management programs.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	169,085			433,582		602,667
SY's	1.9			4.9		6.8

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.0</u>	GRAND TOTAL	<u>7.8</u>
-----------------	------------	-------------	------------

REMARKS: Existing research needs to be augmented in the area of host plant resistance with special emphasis on lygus bugs and the cotton fleahopper.

COTTON INSECTS 1976

Priority 10 / 14

SUBJECT: Management of Periodical Pests of Cotton Such as Spider Mites, Aphids, Cotton Leafperforator, Whiteflies, etc.

RPA: 207

JUSTIFICATION: Periodically, damaging outbreaks of certain so called minor pests such as spider mites, aphids, etc., occur in cotton production areas. To effectively manage these outbreaks, research information on the biology, ecology and methods of control must be available. Since resistance to certain insecticides is known to exist, occasional evaluation of commercial and candidate insecticides must be undertaken to maintain a current status on effective control techniques. In areas where the beet armyworm and leaf perforator are problems, such as the western area, research should be continuous until an adequate storehouse of knowledge is available to successfully manage the pests to prevent serious losses.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	124,595			286,417		411,012
SY's	2.1			4.0		6.1

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0 GRAND TOTAL 6.1

REMARKS: Research on minor pests should be conducted only in areas where the specific species is a serious problem. Limited research in localized areas can service large regions of the cotton area. Duplication of effort is generally not necessary unless regional biological and ecological characteristics indicate desirability and needs for such research.

Cotton Disease Subcommittee Report
to
National Cotton Research Coordinating Committee

Philosophy of Subcommittee

The Cotton Disease Subgroup met in Atlanta and considered research needs for cotton. Resource material included the 1973 National Cotton Research Task Force report, a CRIS printout of current cotton research in progress, and the proposed research in cotton diseases indicated in the 1975 research budget for Cotton Incorporated.

In considering the immediate disease problems, the everchanging disease picture, and long-range research needs to adequately control cotton disease, the committee felt that:

a. Increasing costs of energy and environmental constraints have adverse effects on pesticides and their use. This places increasing emphasis on plant breeding and the development of resistance or immunity as the most satisfactory control of major cotton diseases. Well-developed pathology programs including essential technology are needed in successful breeding efforts.

b. Concurrent well-coordinated research programs in different environments of the cotton belt should provide more critical disease information and more satisfactory control mechanisms of greater general usefulness.

c. Cotton disease research should be cognizant of cotton as a food and feed crop as well as for its use as a source of fiber.

Each panel member reviewed current and related research within his area of representation prior to the meeting.

Membership

Members of the subcommittee submitting the cotton disease report include:

Dr. D. C. Erwin, University of California - Riverside

Dr. Luther S. Bird, Texas A&M University - College Station

Dr. Alfred B. Wiles (ARS), Mississippi State University

Dr. R. W. Roncadori, University of Georgia - Athens

The first 3 members were also members of the Cotton Disease Research Task Group of the National Task Force. Dr. Roncadori is secretary of the Cotton Disease Council. Each member represents a distinct geographic area within the cotton production region.

Dr. John F. Fulkerson (CSRS) associated with the subcommittee as the USDA representative, J. E. Halpin (Director-at-Large, Southern Region) represented the parent committee.

SUMMARY

<u>Priority</u>	<u>Title</u>	<u>Additional SY's</u>	
		<u>Project</u>	<u>Accumulation</u>
<u>1</u> / <u>13</u>	Determination of Inherited Traits That Augment the Control of Seedling Disease	1.5	1.5
<u>2</u> / <u>13</u>	Intensive Research on the Control of the Seed Rot, Damping-off and Root Damage Phases of Seedling Disease	0.8	2.3
<u>3</u> / <u>13</u>	Immunity from Verticillium Wilt Utilizing Mechanisms Present in and on All Plant Parts	1.1	3.4
<u>4</u> / <u>13</u>	Development and Integration of Methods Designed to Reduce the Inoculum Density of <u>Verticillium Dahliae</u>	1.0	4.4
<u>5</u> / <u>13</u>	Evaluation of Current Control Measures and New Approaches to the Control of Cotton	1.4	5.8
<u>6</u> / <u>13</u>	Effect of Growth Retardant Chemicals on the Suppression of Vascular Wilt Diseases	0.6	6.4
<u>7</u> / <u>13</u>	Control of Aflatoxin in Cotton	0.8	7.2
<u>8</u> / <u>13</u>	Role of Microbial Agents in Increasing Mycotoxin Problems in Cotton	1.2	8.4
<u>9</u> / <u>13</u>	Ecology and Control of Nematodes Reducing Cotton Growth and Yield	1.2	9.6
<u>10</u> / <u>13</u>	Applied Nutrients and Nutrient Balances in Soil Affecting Survival of the <u>Phymatotrichum</u> Root Pathogen	0.6	10.2
<u>11</u> / <u>13</u>	Fungal Leaf Diseases of Cotton	0.4	10.6
<u>12</u> / <u>13</u>	Indirect Effects of Herbicides on Cotton Nematode Population Densities	0.6	11.2
<u>13</u> / <u>13</u>	The Role of Mycorrhizal Fungi on the Growth and Health of Cotton	0.4	11.6

COTTON DISEASES - 1975

Priority 1 / 13

SUBJECT: Determination of Inherited Traits That Augment the Control of Seedling Disease

RPA: 208

JUSTIFICATION: Efficient control of seedling disease prevents seed rot, damping-off, and root damage on plants that survive. Many inherited seed and seedling traits, including preservation of planting-seed quality, rates of germination and growth, rates of tissue hardening, and actual resistance to pathogenic organisms aid in controlling all phases of seedling disease. Optimum levels of known traits must be determined and a search for additional traits must be made. Establishing appropriate genetic levels for all traits in cultivars used by growers will provide long-term practical and economical control of seedling disease. This accomplishment would bring a new level of efficiency in production.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	96,325			54,006		150,331
SY's	1.5			0.8		2.3

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.5</u>	GRAND TOTAL	<u>3.8</u>
-----------------	------------	-------------	------------

REMARKS: Research should be conducted in different environmental subregions of the cotton belt and be well coordinated. A five-year program is needed.

COTTON DISEASES - 1975

Priority 2 / 13

SUBJECT: Intensive Research on the Control of the Seed Rot, Damping-Off, and Root Damage Phases of Seedling Disease

RPA: 208

JUSTIFICATION: Seedling disease control is prerequisite to efficient production and consistent control of other disease agents and insects. Established stands must consist of seedlings with roots not damaged by soil-borne organisms. Applied chemicals must favorably influence varieties whether they be fungicides, bactericides, nematocides, or insecticides. Variety-chemical interactions must be removed by finding chemicals that give total control of seedling disease for specific variety backgrounds. Systemic chemicals that nick with genotypes in giving control without disruption by applied herbicides and insecticides would bring new levels of efficiency in crop production.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	113,400			138,600		252,000
SY's	1.8			2.2		4.0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0.8 GRAND TOTAL 4.8

REMARKS: New positions are needed for this research area. Despite the fact that these are seed treatments that control Rhizoctonia and Pythium pre-emergence disease, there is no chemical available that will control the internally-born Xanthomanus, the cause of angular leaf spot (blight). Three-year program.

COTTON DISEASES - 1975

Priority 3 / 13

SUBJECT: Immunity from Verticillium Wilt, Utilizing Mechanisms Present in and on All Plant Parts

RPA: 208

JUSTIFICATION: Immunity from Verticillium wilt in cotton can now be obtained. The many independent genes, which influence resistance in different parts of the plant, must be identified and named. The independent genes which collectively give immunity must then be ascertained and established in cultivars suitable for use by growers. The example to follow is that of bacterial blight for which some 15 independent genes have been identified in cultivars that induce immunity from all known races of the pathogen. Such an approach would accelerate development of wilt-immune cultivars.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	214,200			201,400		415,600
SY's	3.4			3.3	0.6	7.3

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 1.1 GRAND TOTAL 8.4

REMARKS: At present there are no commercial varieties that have more than a high degree of tolerance. Incorporation of immunity or a high degree of resistance into agronomic lines is difficult and arduous but not impossible. Its value, however, would be immense. Six-year program.

COTTON DISEASE - 1975

Priority 4 / 13

SUBJECT: Development and Integration of Methods Designed to Reduce the Inoculum Density of Verticillium Dahliae

RPA: 208

JUSTIFICATION: Verticillium wilt remains one of the most important devastating diseases in the West. Since the incidence and severity of Verticillium wilt is related to the inoculum density in soil, the effects of such factors (singly and combined) as dessication and application of fungitoxic chemicals to infected cotton plant material prior to incorporation into soil, of drying of infested soil by use of deeprooted crops, of rotation to nonsusceptible crops following fumigation, and of flood fallowing should be measured not only by assay of disease incidence and severity but also by analysis of propagule density of Verticillium in soil.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	25,200					25,200
SY's	0.4					0.4

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.0</u>	GRAND TOTAL	<u>1.4</u>
-----------------	------------	-------------	------------

REMARKS: It would be desirable if such a project could be conducted cooperatively between laboratories interested in this area. Five-year program.

COTTON DISEASES - 1975

Priority 5 / 13

SUBJECT: Evaluation of Current Control Measures and New Approaches to the Control of Cotton Boll Rots.

RPA: 208

JUSTIFICATION: Cotton boll rot is one of the most important diseases, causing yield reductions second only to those induced by seedling diseases. Although cultural and fungicide controls are recommended, they are only partially successful at best. A coordinated effort is needed to integrate known control measures into an optimized program. The more recent approach using inherited disease-escape and resistant characters should be incorporated. Investigation into the basic nature of resistance and epidemiological studies should be carried out to devise newer approaches to control. They might consist of a chemical basis for resistance as well as timing boll opening to correspond with a generally anticipated dry period during the preharvest period. The basic information could reveal other newer general approaches.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	18,900			113,400		132,300
SY's	0.3			1.8		2.1

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.4</u>	GRAND TOTAL	<u>3.5</u>
-----------------	------------	-------------	------------

REMARKS: Research should be conducted in several different areas of the midsouth and southeastern part of the cotton belt. Five-year program.

COTTON DISEASES - 1975

Priority 6 / 13

SUBJECT: Effect of Growth Retardant Chemicals on the Suppression of Vascular Wilt Diseases

RPA's: 208, 309

JUSTIFICATION: At least three systemic retardant chemicals (Cycocel, CHE8728, or BAS083) suppress the inoculum density in cotton plants when applied to foliage in the field at squaring time at low concentrations (25-50g/hr). With Cycocel and BAS083, height is reduced and bollset and yield is increased by 10 to 20 percent. This new concept appears to increase resistance of the SJ-2 variety and should be further studied on other varieties and cultural conditions. Growth retardation could also be useful to lessen the effect of rank vegetative growth on boll rots.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	25,200			19,100		44,300
SY's	0.4			0.3		0.7

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0.6</u>	GRAND TOTAL	<u>1.3</u>
-----------------	------------	-------------	------------

REMARKS: Interdisciplinary cooperation with plant physiology in long range research to "engineer" a shorter season type would be desirable. Growth retardants theoretically should be useful in increasing the physiological efficiency of cotton. V. T. Walhood, California, Shafter - USDA, are interested in this aspect. Three-year program.

COTTON DISEASES - 1975

Priority 7 / 13

SUBJECT: Control of Aflatoxin in Cotton

RPA's: 208, 405

JUSTIFICATION: Aflatoxin production is more prevalent in the lower desert areas of the Southwestern United States than in other areas. Factors which influence this should be elucidated to facilitate new approaches to control. Since A. Flavus is widespread but produces aflatoxin in cotton seed only in certain areas, specific ecological or microbiological interaction factors must be involved. Since the tolerance for aflatoxin in cotton seed meal (<20 ppb) is so low, it is imperative that this problem be thoroughly understood to provide the highest level of control possible. Assay methods which are accurate and of minimal cost should be developed to supplement the grossly inaccurate "Black uv light" methods used nor at the gin level. These methods often unduly reduce prices given to the grower.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
-----------------	-----	-----	----	------	-------	-------

Financial

SY's

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0.8</u>	GRAND TOTAL	<u>0.8</u>
-----------------	------------	-------------	------------

REMARKS: Rapid and accurate equipment for assay of aflatoxin is necessary so that large numbers of samples from breeding lines, insecticidal treatments, and fungicidal treatments can be assayed. Five-year program.

COTTON DISEASES - 1975

Priority 8 / 13

SUBJECT: Role of Microbial Agents in Increasing Mycotoxin Problems in Cotton

RPA's: 208, 309

JUSTIFICATION: Changes in production, harvesting, and storage practices, envisioned with increasing energy and environmental costs are increasing the threat of a range of mycotoxin-producing organisms. The role of many naturally occurring fungi in this process is evident in many crops. The potential use of cotton in the food chain heightens manyfold the importance of this problem. A search should be made for fungi and bacteria that produce mycotoxins other than A. flavus which produces aflatoxin. There potentially could be problems with such organisms as Fusarium roseum which causes a mycotoxin on corn or mycotoxins as yet unknown or unrecognized.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
-----------------	-----	-----	----	------	-------	-------

Financial

SY's

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.2</u>	GRAND TOTAL	<u>1.2</u>
-----------------	------------	-------------	------------

REMARKS: The primary thrust of this research would be to adequately cover the range of ecological constraints in the cotton producing areas of this country and gain a scientific knowledge base essential to avoiding serious economic threat to cotton producers due to a problem that may not be foreseen without adequate background research. Three-year program.

COTTON DISEASES - 1975

Priority 8 / 13

SUBJECT: Ecology and Control of Nematodes Reducing Cotton Growth and Yield

RPA: 208

JUSTIFICATION: Management system modifications intended to improve cotton production have aggravated certain nematode problems in cotton. Extensive use of heavy ground equipment has induced the formation of a traffic hardpan in many areas. Not only has root colonization of soil been restricted, but an additional stress accentuating nematode damage has resulted. The use of subsoiling equipment may alleviate the hardpan effect. However, the nematode problem may be magnified by promoting a deeper root system and a more extensive vertical distribution of pathogenic nematode populations. Although application of nematicide fumigants has not been economically feasible, injection of a chemical during the sub-soiling operation shows promise. Information on nematicide distribution and effect at greater depths than they are conventionally applied is needed, along with an understanding of various nematode population changes.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial						
SY's	2.3			1.1		3.4

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.2</u>	GRAND TOTAL	<u>4.6</u>
-----------------	------------	-------------	------------

REMARKS: Research should be undertaken in light sandy soils of Southeast. Cooperation with Agricultural Engineering in subsoiling-nematicide placement essential. Three-year program.

COTTON DISEASES - 1975

Priority 10 / 13

SUBJECT: Applied Nutrients and Nutrient Balances in Soil Affecting Survival of the Phymatotrichum Root Pathogen

RPA's: 208, 309

JUSTIFICATION: New research indicates the concentration of sodium in soil has a major influence on survival of the Phymatotrichum root rot fungus. Concentrations and sources of sodium to apply in different soils for obtaining consistent results must be ascertained. The role of sodium alone and in combinations with other nutrients in inhibiting fungal development must be ascertained. The results will not only provide an additional practice for controlling root rot but may provide information helpful in reducing losses from other diseases.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial						13,640
SY's				0.2		0.2

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0.6</u>	GRAND TOTAL	<u>0.8</u>
-----------------	------------	-------------	------------

REMARKS: Four-year program.

COTTON DISEASES - 1975

Priority 11 / 13

SUBJECT: Fungal Leaf Diseases of Cotton

RPA: 208

JUSTIFICATION: Fungal leaf spots of cotton incited by Alternaria and Cercospora spp. and Ascochyta, cause premature loss of leaf area with corresponding reduction in photosynthate production as well as premature boll opening. Direct losses are reflected in both yield and quality. Diseased leaves serve as growth media for subsequent growth of boll rot pathogens. Possible relationships: physiological stresses that may predispose the host, host range and life cycles of the pathogens, and host resistance. Laboratory methods for inoculum production, study of disease development undercontrolled environmental conditions and development of screening methodology for use in developing host resistance are needed.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	47,900			78,525		126,425
SY's	0.6			1.3		1.9

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0.4

GRAND TOTAL 2.3

REMARKS: Three-year program.

COTTON DISEASES - 1975

Priority 12 / 13

SUBJECT: Indirect Effects of Herbicides on Cotton Nematode Population Densities

RPA's: 208, 309

JUSTIFICATION: Cotton production losses from nematodes have doubled during the last 10 years. This period has been marked by certain crop management changes which apparently have aggravated the problem. Widespread use of herbicides has had a selective effect on the species composition of weed populations. Consequently, weeds such as Cyperus spp. and Sorghum haptense make up a sizeable segment of the population. Recent studies have shown that they serve as hosts for the root knot and lance nematodes, thereby serving as inoculum reservoirs during dormant or fallow periods. Various annual and perennial weeds which predominate where herbicides are used, should be evaluated as alternative hosts for nematodes pathogenic on cotton. Proper use of feasible herbicides could then reduce this additional reservoir of inoculum.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
-----------------	-----	-----	----	------	-------	-------

Financial

SY's

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0.6</u>	GRAND TOTAL	<u>0.6</u>
-----------------	------------	-------------	------------

REMARKS: Results from several different areas of the cotton belt are needed since the makeup of alternative weed hosts would vary geographically. Overall program should be coordinated. Three-year program.

COTTON DISEASES - 1975

Priority 13 / 13

SUBJECT: The Role of Mycorrhizal Fungi on the Growth and Health of Cotton

RPA's: 208, 309

JUSTIFICATION: Fumigation of soil with chloropicrin and methyl bromide to control Verticillium wilt is complexed by destruction of mycorrhizal organisms now known to be associated with uptake of mineral nutrients. The role of mycorrhizal fungi should be further studied from the basic standpoint to determine their distribution in different agricultural soils to determine whether an increase in understanding of their role can be exploited to increase the efficiency of uptake of nutrients by plants with a subsequent increase of yield.

Since mycorrhizae affect plant vigor, they may also exert a marked effect upon the host's response to other diseases. We have no current understanding of the interaction between endomycorrhizal plants and soil-borne pathogens such as nematodes and fungi.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial				44,000		44,000
SY's				0.7		0.7

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0.4</u>	GRAND TOTAL	<u>1.1</u>
-----------------	------------	-------------	------------

REMARKS: Three-year program.

Weed Control Subcommittee Report
to
National Cotton Research Coordinating Committee

Philosophy of Subcommittee

Inadequate weed control costs cotton farmers more than \$170,000,000 annually. Herbicides have largely replaced more expensive hand labor for controlling weeds. In fact, the level of herbicides exceeds the combined expenditures for insecticides, fungicides, and nematocides.

Using the best regionally adapted methods, farmers can do a reasonably good job of controlling crabgrass, pigweed, barnyardgrass, and several other annual and some perennial weeds in the seedling stages. We lack the ability to control many perennial weeds and several newly introduced annual weeds without resorting to highly expensive systems that often involve significant amounts of hand labor. These resistant weeds are now the primary targets for research and especially the incorporation of control techniques for these weeds into integrated systems for economic weed control.

The area of weed control in cotton has grown in importance partly because of ecological shifts that have resulted in the presence of weeds more difficult to control than those that were present 10 to 20 years ago. These relatively new weeds that are difficult to control include Florida beggarweed, tall panicum, jimsonweed, velvetleaf, bermudagrass, prickly sida, spurred anoda, and spurges in the Southeast; while johnsongrass, horsenettle, nightshade, lance leaf sage, devil's claw, silver leaf nightshade, field bindweed, spurred anoda, and Wright groundcherry are of increasing importance in the Western United States. Failure to control some of these weeds results in disastrous situations where yield losses may surpass 30 percent to 40 percent (3). Because of the severity of the weed control problem, the 1973 National Cotton Research Task Force Report recommended a 42 percent increase in the research effort devoted to weed control in cotton. Actual expenditures in 1975 were down 17 percent of 1973 (6).

The importance of chemical weed control to the cotton farmer is demonstrated by the fact that 82 percent of the cotton acreage is treated with herbicides (1). Herbicide sales now represent 57 percent of all pesticide dollar sales (2) and the production of organic herbicides has grown at an average rate of 12 percent per year during the last 10 years (5). Unfortunately, extensive use of herbicides has resulted in some soil persistence problems and there are restrictions as to which crop can follow cotton in rotations. There are also known adverse interactions to some of the herbicides with other pesticides, and there are undoubtedly many unknown interactions. These problems, combined with our inability to control most perennial weeds and several annual weeds, emphasize the need for research to develop integrated systems for economic weed control.

The 1973 Task Force Report concluded that public agencies devoted too much effort to the evaluation of herbicides in the primary and secondary evaluation stage. This 1973 report suggested that one site in each of the four Regions,

(a) the Delta Region, (b) Coastal Plains, (c) the High Plains, and (d) the Far West, would suffice in providing this information to other researchers throughout the Cotton Belt. The principle of conducting herbicide evaluation work at only four individual locations is still valid, although the present study found that the research effort devoted specifically to evaluation has significantly decreased during the last three years. Weed scientists are to be complimented on the redirection of their research efforts and are urged to continue to devote their efforts to those research areas designated with highest priorities in this report. In addition to this redirected effort, it is imperative that the research effort devoted to weed control in cotton be increased in the near future. An increased effort is essential because weed control problems are increasing at an alarming rate, and because there is a time lag of several years between the development of new weed control techniques involving herbicides and final registration by EPA and subsequent usage by farmers.

Herbicides are in shorter supply than all other pesticides in terms of farmer demands not being met (7). This fact, plus constantly changing weed ecology, stresses even more the need for increased research in cotton weed control.

Membership

Chairman, Dr. Walter K. Porter, Jr., Associate Director, Mississippi Agricultural and Forestry Experiment Station, Mississippi State University, Mississippi State, Mississippi, 39762.

Dr. C. G. Shepherd, Superintendent, Delta Branch Mississippi Agricultural and Forestry Experiment Station, Stoneville, Mississippi, 38776.

Dr. C. G. McWhorter, Laboratory Chief, Southern Weed Science Laboratory, United States Department of Agriculture, Agricultural Research Service, Stoneville, Mississippi 38776.

Dr. J. M. Brown, Manager, Production Technology, National Cotton Council of America, Memphis, Tennessee 38112.

Dr. A. J. Loustalot, United States Department of Agriculture, Cooperative State Research Service, Washington, D. C. 20250.

Dr. C. R. Swanson, Assistant to Deputy Administrator, Southern Region, United States Department of Agriculture, Agricultural Research Service, New Orleans, Louisiana 70153.

Dr. H. R. Hurst, Project Leader, Weed Control, Delta Branch, Mississippi Agricultural and Forestry Experiment Station, Stoneville, Mississippi 38776.

Dr. E. W. Hauser, Research Agronomist, United States Department of Agriculture, Agricultural Research Service, Georgia Coastal Plain Experiment Station, Tifton, Georgia 31794.

Dr. A. F. Wiese, Professor, Weed Science, Southwestern Great Plains Research Center, Texas Agricultural Experiment Station, Bushland, Texas 79012.

Resource Material

(1) Farmers Use of Pesticides in 1971. ERS-USDA, Agricultural Economic Report No. 268.

(2) The Pesticide Review. U. S. Department of Agriculture, 1971.

(3) Extent and Cost of Weed Control with Herbicides and an Evaluation of Important Weeds. ARS-H-1, November, 1972.

(4) 1973 National Cotton Research Task Force Report.

(5) The Pesticide Review, U. S. Department of Agriculture, 1974.

(6) Cotton Weed Control Printout - Current Research Information System, CRIS Identification No. 529300, October 21, 1975.

(7) Evaluation of Pesticide Supplies and Demand for 1972, 1975, and 1976. ERS-USDA, Agricultural Economic Report No. 300.

WEED CONTROL

Priority 1 / 3

SUBJECT: A. Development of Economical and Environmentally Acceptable Practices for Controlling Weeds in Cotton with Emphasis on Integrated Systems

RPA: 209

JUSTIFICATION: For many years, much research for weed control in cotton has been concerned primarily with evaluation of a large number of candidate herbicides. From these many experiments have emerged a relatively small number of herbicides registered for use as treatments with cotton. As herbicides were increasingly used, or as use of a single herbicide became predominate in an area, the uncontrolled spectrum of weeds changed in many localities from easily controlled annuals to problem weeds such as Texas panicum, johnsongrass, nutsedge, nightshade, cocklebur, sicklepod, prickly sida, velvetleaf, spurred anoda, Wright groundcherry and Florida beggarweed. A review of previous research including the effectiveness of vigorous, precise and timely cultivation, leads one to the belief that we now have the diverse tools needed for effectively controlling most of the weeds in cotton. What is lacking is research designed to integrate these diverse tools into effective programs of weed control. Integrated studies on systems of weed control can provide relatively rapid answers to many of the more vexing weed problems facing cotton farmers. The probability for productive experimentation is very high since previous research has already firmly established the value of the components to be employed in the integrated systems.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	173,743	0	0	204,410	0	378,153
SY's	3.4	0	0	4.0	0	7.4

ESTIMATED RESEARCH NEEDS: To develop effective and economical systems of controlling weeds in cotton with minimal impact on the environment.

APPROACHES: (a) Develop economical integrated systems of weed control involving (1) different cropping sequences and rotations, (2) various combinations of chemical and cultural methods, (3) the most effective herbicide and combinations of herbicide treatments, and (4) the most effective available mechanical means.

(b) Investigate the interaction between herbicides and (1) other pesticides, (2) cotton varieties, (3) diseases and other pests of cotton, (4) rainfall, (5) temperature, and (6) soil types.

(c) Determine if undesirable levels of herbicides remain in the soil following various systems of weed control, and determine the fate of herbicides in soils and plants (especially as pertains to possible undesirable or illegal residues in succeeding crops).

ADDITIONAL SY's 7.6

GRAND TOTAL 15.0

REMARKS: This research area has highest level priority. The subcommittee recommends that the present SY input and financial support should be essentially doubled.

WEED CONTROL

Priority 2 / 3

SUBJECT: B. Engineering Aspects and Development of Equipment for Improved Weed Control in Cotton

RPA: 209

JUSTIFICATION: A minimal amount of effort is currently directed toward the development of application equipment, herbicide placement and drift control. Additional research is needed to improve weed control and reduce cotton production costs. Considerable savings could be made in weed control costs with the development of improved herbicide application equipment and cultural techniques. Pressures from ecologists and EPA dictate the need for techniques of more precise application, using lesser amounts of herbicide. Specific weed problems resulting from a changing ecosystem will require special attention. Closer interfacing of weed control and engineering researchers is essential to achieve these goals.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	74,214	0	0	25,745	0	99,959
SY's	0.7	0	0	1.0	0	1.7

ESTIMATED RESEARCH NEEDS: To develop methods and equipment that effectively and economically control weeds in cotton.

APPROACHES: (a) Develop precision equipment for selective applications of herbicides. Further development of equipment for sensing and treating isolated weed infestations and for treating/destroying weeds of different sizes than the crop. Develop specialized equipment for selective mechanical removal of small seedling weeds from seedling cotton.

(b) Develop improved seedbed preparation, improved planters, and optimum planting patterns (plant densities and spacings) for more precise herbicide applications and more effective and efficient crop-weed competition as related to weed control in cotton.

(c) Study the possibilities of nonaqueous diluents that would provide effective weed control by simplified applications, reduced effective herbicide rates, more selective control and possibly reduced pesticide drift. Determine effects of herbicide drift on cotton and adjacent crops.

ADDITIONAL SY's	<u>6.3</u>	GRAND TOTAL	<u>8.0</u>
-----------------	------------	-------------	------------

REMARKS: This research area has second level priority. Needed SY input and financial support should be approximately four times the existing level.

WEED CONTROL

Priority 2 / 3

SUBJECT: C. Control of Perennial Weeds and of Weeds Emerging as New Problems in the Ecosystem

RPA: 209

JUSTIFICATION: Weed populations are dynamic and constantly changing -- often subtly but sometimes rapidly depending on the pressures applied. Most herbicides control annual weeds more effectively than perennials. Consequently, the widespread use of selective herbicides in cotton has resulted in ecological shifts from weeds easily controlled to either perennials such as nutsedge and johnsongrass, or annual or perennial weeds emerging in the ecosystem as new problems. Although nutsedge and johnsongrass can be controlled by utilizing current technology, the methods involved are expensive and difficult. Consequently, improved control methods for these two perennial weeds are needed. Experience has shown that placing severe pressure on the ecosystem can also lead to entirely new weed problems. Sometimes these problem weeds exist in the population for many years but will not dominate until other weeds are removed with selective herbicides. Horsenettle, nightshade, silver leaf nightshade, field bindweed, velvetleaf, bermudagrass, spurge(s), nutsedge and Wright groundcherry are examples of this problem. Herbicide-resistant annual or perennial weeds emerging as problem weeds should receive intensive research emphasis before they become regional or national problems.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	14,567	0	0	16,238	0	30,805
SY's	0.0	0	0	1.3	0	1.3

ESTIMATED RESEARCH NEEDS: To develop effective and economical control techniques of perennial and new problem weeds in cotton.

APPROACHES: (a) Develop, in cooperative studies between agricultural engineers and weed scientists, better mechanical tools and methods for reducing infestations of nutsedge, johnsongrass, horsenettle, bermudagrass, velvetleaf, and other problem perennial weeds.

(b) Develop herbicide rotations within the cotton crop to avoid continuous use of a single herbicide (or a single sequence of herbicides), thereby reducing the likelihood of innocuous annual weeds becoming major weed problems.

(c) Through crop-herbicide rotations and mechanical techniques, develop control measures for crops grown in rotation with cotton thereby reducing the weed problems during the year cotton is grown.

ADDITIONAL SY' 3.7

GRAND TOTAL 5.0

REMARKS: This area should also receive second level priority. Total SY input and financial support should be approximately four times the current level if it is to be adequately researched.

WEED CONTROL

Priority 3 / 3

SUBJECT: D. Physiological, Biological, and Genetic Responses of Cotton and Weeds to Weed Control Materials and Methods

RPA: 209

JUSTIFICATION: Due to the critical severity of weed problems facing the cotton farmer, primary attention should be focused on field plot research designed to alleviate the economic losses resulting from yield reductions and from harvesting problems created by uncontrolled weeds in cotton fields. However, while the present technology is being integrated into effective weed control systems, some experimentation should be conducted on physiological, biological, and genetic responses of cotton to control methods. As the more pressing current weed problems are resolved, more effort could be diverted to expanding studies of a very fundamental nature.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	26,641	0	25,000	52,559	0	104,200
SY's	0.3	0	0	1.7	0	2.0

ESTIMATED RESEARCH NEEDS: To study the physiological, biological, and genetic responses of cotton to weed control methods.

APPROACHES: (a) Determine the effects of cotton herbicides on soil microbiology and predisposing the crop to infection by diseases. Determine the feasibility of improving weed control by breeding cotton varieties with increased herbicide tolerance.

(b) Determine physiological and anatomical characteristics of specific weeds and evaluate these characteristics as a means of regulating growth of weeds. Determine effects of cotton herbicides on metabolic systems in cotton and weeds.

(c) Develop biological and biochemical methods for controlling weeds in cotton (for example, insects and diseases as control agents; use of plant exudates; destruction of weed seed dormancy).

ADDITIONAL SY's 2.0

GRAND TOTAL 4.0

REMARKS: This research area should be considered as third level priority. A doubling of the existing SY input and financial support is needed to conduct recommended expanded research.

WEED CONTROL

Priority 3 / 3

SUBJECT: E. Economic Thresholds of Weed Populations in Cotton

RPA: 209

JUSTIFICATION: Additional basic information on the ecological relationships between the most difficult to control weeds and cotton is needed. What densities of weeds are required to reduce the yields of cotton? How long must cotton be kept weedfree to minimize or avoid adverse effects from weed competition? Conversely, how long can weeds compete with cotton before yield is reduced? Competition studies are limited. In most instances, we do not know what weedfree intervals are required to avoid yield reductions from our most troublesome grassed and broadleaf weeds.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	69,210	0	0	47,484	0	116,694
SY's	1.0	0	0	0.7	0	1.7

ESTIMATED RESEARCH NEEDS: To define competitive relationships between cotton and weeds and to relate these relationships to weed control technology.

APPROACHES: (a) Determine the stage of cotton growth most vulnerable to weed competition and amount of weed competition (density) required to reduce the yield of cotton.

(b) Determine effects of weed competition on different cotton varieties and advanced cotton breeding strains.

ADDITIONAL SY's 1.3

GRAND TOTAL 3.0

REMARKS: Even though this is third-level priority, compared to other areas of research discussed in this report, the subcommittee feels it to be of significant importance with increasing production costs. Current SY level of support is relatively low and it is recommended that this level be essentially doubled.

SUMMARY
OF
RECOMMENDED RESEARCH EFFORT FOR CONTROL OF WEEDS

Priority	<u>Title</u>	Additional SY's <u>Accumulative</u>
1/3	A. Development of economical and environmentally acceptable practices for controlling weeds in cotton with emphasis on integrated systems	7.6
2/3	B. Engineering aspects and development of equipment for improved weed control in cotton	6.3
2/3	C. Control of perennial weeds and of weeds emerging as new problems in the ecosystem	3.7
3/3	D. Physiological, biological, and genetic responses of cotton and weeds to control materials and methods	2.0
3/3	E. Economic thresholds of weed populations in cotton	1.3

Cotton Mechanization Subcommittee Report
to
National Cotton Research Coordinating Committee

Philosophy of Subcommittee

The increasing concern with production costs and the reduction of pollution from harvesting and processing have given added importance to the area of cotton mechanization research. These concerns mandate additional resources in this area if we are to maintain a viable segment of our farming enterprise and to meet those problems that influence the quality of life. At the same time, we must look for ways to improve production and processing operations through better machines and methods. Improvements not only will assure a more competitive agriculture but will improve the quality of the product and thus enhance the income of the cotton producer.

The subcommittee looked into research that should be maintained at the present level of SY's with appropriate funding and research where added resources, either new and/or reallocated, will be necessary to accomplish the objectives. Present-day changes in economics often are sudden. Therefore, resources should be at a level commensurate with the need to solve the problems in a reasonable length of time.

Membership

George A. Slater, Chairman, Cotton Incorporated

J. K. Jones, Cotton Incorporated

John Goss, Cooperative State Research Service, USDA

Walter Lovely, Agricultural Research Service, USDA

SUMMARY - RPA's 308 and 309

<u>RPA</u>	<u>Priority</u>	<u>Title</u>	<u>Accumulative Total</u>	
			<u>Funds</u>	<u>75/76 SY's</u>
308A	1	Efficient Use of Energy for Cotton Production and Processing	\$ 1,197,268	25.40
308B	1	Reduction of Trash and Dust in Seed Cotton Lint and Cottonseed	812,131	8.23
308C	2	Environment Modification and Conservation	416,104	4.34
309A	2	Evaluation of Emerging Technology	176,579	1.79
309B	1	Machine Systems Analysis for Optimum Returns	234,700	3.58
309C	3	Relationships between Cotton Production and Other Farm Enterprises	84,578	1.59

COTTON PRODUCTION AND PROCESSING ENGINEERING, 1975/76

Priority 1

SUBJECT: Efficient Use of Energy for Cotton Production and Processing

RPA: 308A

JUSTIFICATION: National concern with the conservation of energy resources adds a new priority to engineering machinery and process design for optimizing cotton production, harvesting, and ginning processes. This machinery and labor, damage to soil structure by frequent trips through the field, demands for faster harvesting and ginning, and quality preservation with low trash content of the lint have focused attention on the needs for new or improved methods and machinery systems for production, harvesting, and ginning of cotton.

CURRENT STATUS:	ARS	ERS	CSRS	SAES	CI	OTHER	TOTAL
Financial	573,873		126,251	486,794	220,133	10,350	1,197,268
SY's	10.19			12.8	2.41		25.4

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 5.6

GRAND TOTAL 31

COTTON PRODUCTION AND PROCESSING ENGINEERING, 1975/76

Priority 1

SUBJECT: Reduction of Trash and Dust in Seed Cotton, Lint and Cottonseed

RPA: 303B

JUSTIFICATION: The associated relatively high levels of trash and dust in the machine harvested seed cotton, lint, and cottonseed directly affect production costs and ginning and mill performance. Research has been conducted to improve trash removing machinery. However, the respiration problems in mill workers recently associated with cotton dust complicates the competitive position of cotton and adds emphasis to needs for improved trash removal systems in the field and gin.

CURRENT STATUS:	ARS	ERS	CSRS	SAES	CI	OTHER	TOTAL
Financial	777,792		1,296	33,043			812,131
SY's	7.54			0.69			8.23

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 3.77 GRAND TOTAL 11

COTTON PRODUCTION AND PROCESSING ENGINEERING, 1975/76

Priority 2

SUBJECT: Environment Modification and Conservation

RPA: 308C

JUSTIFICATION: Preservation of a clean environment has become a national problem. While we must be concerned with preservation of man's environment, we must be able to manipulate the crop plants' environment to achieve optimum production without upsetting the ecological balance.

CURRENT STATUS:	ARS	ERS	CSRS	SAES	CI	OTHER	TOTAL
Financial	402,438		5,093	8,573	39,122		416,104
SY's	4.08			0.26	0.2		4.34

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.66

GRAND TOTAL 7.0

COTTON PRODUCTION AND PROCESSING ENGINEERING, 1975/76

Priority 2

SUBJECT: Evaluation of Emerging Technology

RPA: 309A

JUSTIFICATION: As a result of expanded research programs, new production techniques continue to become available for consideration as a part of production systems for cotton. Because of the number of these innovations and, in many cases, the sizable investment associated with them, they need to be evaluated in terms of their economic feasibility early in their development and introduction on farms. Such an evaluation would keep farmers from having to appraise these techniques on a costly trial-and-error basis.

CURRENT STATUS:	ARS	ERS	CSRS	SAES	CI	OTHER	TOTAL
Financial		25,878	30,529	145,756		294	176,579
SY's				1.79			1.79

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.21

GRAND TOTAL 4

COTTON PRODUCTION AND PROCESSING ENGINEERING, 1975/76

Priority 1

SUBJECT: Machine Systems Analysis for Optimum Return

RPA: 309B

JUSTIFICATION: Farm managers must often choose from among a number of possible alternatives in selecting a sequence of operation, sizes, and types of machinery to be used, operations to be performed, as well as other factors in the planning for each crop to be produced. Plans must be flexible in order to cope with the changes brought by weather, insects, diseases, or some other eventuality. Better data are needed on the variables that may be encountered to effectively make optimum choices. As the size of the farming unit increases, more alternatives become available and accurate information becomes even more important in making optimum choices.

Engineers and biological scientists are developing a mathematical model of the complete cotton production system from land preparation through ginning (RPA 308). Subsystem models that will make up the overall model are being worked on and will include data on soil-machine relationships, cotton plant growth, pest models, and harvest-handling-ginning models. When all of the subsystem models are interfaced into the production model, operations research methods can be applied to give continuous economic analysis of production practice alternatives.

CURRENT STATUS:	ARS	ERS	CSRS	SAES	CI	OTHER	TOTAL
Financial	62,617	91,717	27,596	38,596		13,898	234,700
SY's	1.5	0.9		1.12			3.58

ESTIMATED RESEARCH NEEDS:

ADDITIONAL 0.42

GRAND TOTAL 4

COTTON PRODUCTION AND PROCESSING ENGINEERING, 1975/76

Priority 3

SUBJECT: Relationships Between Cotton Production and Other Farm Enterprises

RPA: 309C

JUSTIFICATION: Enterprise evaluations per se are useful for certain purposes, but an enterprise cannot be completely and properly evaluated until it is fitted into total farm systems. Certain complementary and supplementary relationships exist between farm enterprises, and the way they fit into a system has a decided influence on the efficiency with which resources can be used in a farm system. Proper enterprise combinations should lead to more efficient use of all production resources and lead to hidden economies in the production of specific crops such as cotton.

CURRENT STATUS:	ARS	ERS	CSRS	SAES	CI	OTHER	TOTAL
Financial			8,839	75,739			84,578
SY's				1.59			1.59

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's .66

GRAND TOTAL 2

Cotton Improvement Subcommittee Report
to
National Cotton Research Coordinating Committee

The Cotton Improvement Subcommittee with Dr. M. A. Massengale as Chairman first met in New Orleans in January just prior to the meeting of the parent committee. The subcommittee used the following resource materials in its review: A CRIS printout of current cotton research in progress in RPA's 307 and 405; Research Opportunities, Cotton Improvement, pages 71-79, in the 1973 National Cotton Research Task Force Report; and, the proposed research in cotton improvement indicated in the 1975 research budget for Cotton Incorporated.

There has been about a ten percent decrease in SY's working in RPA's 307 and 405 since the 1973 task force was prepared. The subcommittee agreed in general with the priorities established in the 1973 task force report. It was concluded that the current situation does not dictate major changes in the priorities as established in 1973.

The Cotton Improvement Subcommittee worked by mail and telephone since the New Orleans meeting to develop a report in accordance with the format established at this meeting. Eight priority areas needing research were established and one-page writeups were developed. Considerable difficulty was experienced in developing financial and SY information of the proposals.

Membership

Members of the subcommittee submitting the cotton improvement report are as follows:

Dr. James B. Pate, ARS-USDA, Tucson, Arizona

Dr. Dwayne R. Buxton, University of Arizona, Tucson, Arizona

Dr. G. A. Niles, Texas A&M University, College Station, Texas

Dr. W. H. Wessling, Cotton Incorporated, Raleigh, North Carolina

Dr. G. Jividen, Cotton Incorporated, Raleigh, North Carolina

Drs. M. J. Wright and C. O. Grogan, CSRS-USDA, Washington, D. C.

Dr. P. A. Miller, ARS-USDA, Beltsville, Maryland

Dr. Martin A. Massengale, University of Arizona, Tucson, Arizona, served as Chairman of the Subcommittee through the New Orleans meeting in January.

SUMMARY - COTTON IMPROVEMENT

<u>Priority</u>	<u>Title</u>	<u>Additional SY's</u>	
		<u>Project</u>	<u>Accumulation</u>
<u>1 / 8</u>	Reduce Plant Trash and Respirable Dust through Cultural Practices and Incorporation of Trash-Reducing Characteristics	3.10	3.10
<u>2 / 8</u>	Improve Cotton Varieties by Incorporation of Disease and Insect Resistant Factors in Breeding Programs	2.50	5.60
<u>3 / 8</u>	Improve Photosynthetic Efficiency through More Efficient Utilization and Translocation of Photosynthates and Adaptation of Cotton to Environmental Stress Factors	2.50	8.10
<u>4 / 8</u>	Provide Broader Genetic Base for Cotton Improvement through Additional Germ Plasm Use and Screening of Germ Plasm for Useful Plant Characters	2.00	10.10
<u>5 / 8</u>	Improve Cotton Seed Quality for Food Purposes through Biochemical Profiling, Breeding, and Selection	1.60	11.70
<u>6 / 8</u>	Integrate Improved Cultural Practices into a Total Production System	3.00	14.70
<u>7 / 8</u>	Develop Methods for Improved Quality Seed for Planting Purposes	2.00	16.70
<u>8 / 8</u>	Development of Production Systems (including plant types) That Maximize Yield per Unit of Water	1.25	17.95

COTTON IMPROVEMENT

Priority 1 / 8

SUBJECT: Reduce Plant Trash and Respirable Dust through Cultural Practices and Incorporation of Trash-Reducing Characteristics

RPA's: 307, 405

JUSTIFICATION: The reduction of plant trash and respirable dust through cultural practices and incorporation of trash-reducing characteristics is of utmost necessity to remove health hazards to textile workers and assure a continuous market place for cotton.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	47,336		98,000	183,093	2,795	331,224
SY's	.80		1.70	4.40		6.90

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>3.10</u>	GRAND TOTAL	<u>10.00</u>
-----------------	-------------	-------------	--------------

REMARKS: In spite of the seriousness of the problem relatively little effort has been made to find and incorporate mutant characteristics into commercially acceptable plant types. Frequently, characteristics used in insect-resistance work (frego, glabrous, etc.) also are effective in trash reduction. For this reason, money and SY's will most likely overlap in these two areas. Drs. M. J. Wright and C. O. Grogan represented CSRS and helped us in our work by providing CRIS materials and reviewing priority topics for research.

COTTON IMPROVEMENT

Priority 2 / 8

SUBJECT: Improve Cotton Varieties by Incorporation of Disease and Insect Resistant Factors in Breeding Programs

RPA's: 307, 405

JUSTIFICATION: Disease and insect pests represent significant factors in cotton production, through direct crop losses which they effect and the crop protection costs which they necessitate. Development of pest resistant cultivars offers an effective and permanent means of minimizing crop damage, reducing production costs and cropping energy requirements and lessening pesticidal contamination of the environment. Genetic sources of resistance to the major disease and insect pests have been identified, and these must be combined with numerous agronomic and quality traits to produce acceptable varieties for various ecological and production regions. Methodologies should be refined to facilitate transfer of resistance traits from exotic sources and to alleviate breeding problems arising from adverse genetic and physiological associations.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	133,005		8,878	77,053	23,264	242,200
SY's	2.04		0.15	1.36	0.41	3.96

ESTIMATED RESEARCH NEEDS:

ADDITIONAL 2.50 GRAND TOTAL 6.46

REMARKS: Priorities of breeding for pest resistance will differ somewhat among production regions, depending on diseases and insects of major importance. Involvement of pathologists and entomologists and regional coordination of research is necessary. Should be continuing program.

COTTON IMPROVEMENT

Priority 3 / 8

SUBJECT: Improved Photosynthetic Efficiency through More Efficient Utilization and Translocation of Photosynthates and Adaptation of Cotton to Environmental Stress Factors

RPA's: 307, 405

JUSTIFICATION: Between 90 and 95 percent of plant dry weight is accounted for by products of photosynthesis (carbohydrates). Thus, development of cotton cultivars that have high rates of plant photosynthesis should result in high productivity of total biomass. However, because of reasons associated with its indeterminate growth habit, cotton is often inefficient in partitioning a high proportion of the total biomass into lint and seed. During stress environments, such as high summer temperature, non-optimum soil moisture, or short growing seasons, this inefficiency can be reduced to even lower levels. It follows that cultivars with high rates of photosynthesis that translocate a high proportion of their photosynthate to harvestable fruit will have high yields. Emphasis should be placed on research to identify genetic lines and/or cultural practices that are associated with high rates of photosynthesis by cotton crops with a high proportion of photosynthetic products incorporated into lint and seed.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	431,193		7,164	68,456	24,432	531,245
SY's	6.53		0.14	1.30	0.46	8.43

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.50 GRAND TOTAL 10.93

REMARKS: The total research program should consider the range of environmental conditions under which cotton is grown. Needs and approaches will vary from region to region.

COTTON IMPROVEMENT

Priority 4 / 8

SUBJECT: Provide Broader Genetic Base for Cotton Improvement through Additional Germ Plasm Use and Screening of Germ Plasm for Useful Plant Characters

RPA's: 307, 405

JUSTIFICATION: Continued modification and improvement of cultivated cotton requires availability of genetic variability from which new or improved characters can be selected. A diversity of germ plasm is available in collections of obsolete Uplands, foreign Uplands, taxonomic races, and species of *Gossypium*. These should be systematically screened to identify genetic traits useful for improvement of yield components, growth and fruiting habit, fiber and seed properties, and pest resistance. Appropriate cytogenetic, and breeding methodologies must be utilized to solve difficulties of photoperiodism and genetic barriers and to effect transfer of exotic traits into agronomically acceptable types. Concerted efforts should be made to augment existing collections of germ plasm and ensure continuing maintenance and availability of stocks.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	237,763		1,733	109,364	19,734	368,594
SY's	3.51		0.04	2.39	0.43	6.37

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.00 GRAND TOTAL 8.37

REMARKS: This program would provide effective defense against genetic vulnerability and provide the "raw-material" for future breeding improvement of cotton. Provisions should be made for tropical facilities to maintain, study and utilize photoperiodic and perennial stocks.

COTTON IMPROVEMENT

Priority 5 / 8

SUBJECT: Improve Cotton Seed Quality for Food Purposes through Biochemical Profiling, Breeding, and Selection

RPA's: 307, 405

JUSTIFICATION: Scarcity of food for the world population is becoming more dangerous as its growth exceeds food production. High quality cottonseed is becoming more valuable as a high protein additive for other food stuffs.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	173,421		97,000	23,225	248	293,894
SY's	2.60		2.00	.20	0.0	4.80

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.60</u>	GRAND TOTAL	<u>6.40</u>
-----------------	-------------	-------------	-------------

REMARKS: Future needs in the food supply area will necessitate greater research effort in this area. Identification of superior genotypes on the basis of nutritional value are to bring about greater accomplishments and advances.

COTTON IMPROVEMENT

Priority 6 / 8

SUBJECT: Integrate Improved Cultural Practices into a Total Production System

RPA's: 307, 405

JUSTIFICATION: Interface is needed between experimental results and field application by the producers. New methods must be rapidly applied and the gap between research and the extension service must be filled.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	21,359		94,300	84,136		199,795
SY's	0.0		1.33	2.30		3.63

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 3.00

GRAND TOTAL 6.63

REMARKS: A large amount of scientific expertise appears to be devoted to full-time nutrient research. If a part of this effort could be diverted in each of the states to new approaches and follow through past the research level, there is a better chance for producer application. The projects dealing primarily with nutrition have been split from those dealing with other cultural practices.

COTTON IMPROVEMENT

Priority 7 / 8

SUBJECT: Develop Methods for Improved Quality Seed for Planting Purposes

RPA's: 207, 405

JUSTIFICATION: Obtaining a stand is still the first and foremost problem faced by a majority of producers. Quality seed production processing and the methods to predict field performance are vital to competitive production. In many areas, over half of the fields must be replanted each year.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	187,138		157,200	132,295		476,633
SY's	6.50		1.85	0.0		8.35

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.00 GRAND TOTAL 10.35

REMARKS: Many workers now assigned to seed work on the major crops place cotton as the crop to be worked on "next." In a great many cases, we never seem to get to the "next" crop. Supervision is needed to assure cotton gets its fair share of work or is dropped from the assigned priorities for these workers.

COTTON IMPROVEMENT

Priority 8 / 8

SUBJECT: Development of Production Systems (including plant types) That Maximize Yield per Unit of Water

RPA's: 307, 405

JUSTIFICATION: In much of the cotton belt, stored soil moisture plus precipitation during the growing season are not sufficient to supply consumptive water requirements of cotton without at least isolated periods of plant moisture stress. In many of these areas, supplemental irrigation is used to supply a portion of the water requirement. Irrigation is energy intensive. This is especially apparent in areas where pumping is involved. With the recent shortage of energy and subsequent high energy costs, the amount of water used for cotton production has become of greater concern. In many areas, the amount of irrigation water may be limited. Development of production practices and/or cultivars that are more efficient in water use will minimize the adverse effects of drought in nonirrigated areas and reduce the amount of water required in irrigated areas.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	95,473			10,721		106,194
SY's	1.55			0.18		1.73

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.25</u>	GRAND TOTAL	<u>2.98</u>
-----------------	-------------	-------------	-------------

REMARKS: Emphasis should be placed on development of cultivars and production systems that require less water per unit of yield.

Pollution Control in Production and Processing of Cotton Subcommittee Report
to
National Cotton Research Coordinating Committee

Philosophy of Subcommittee

Research on pollution as related to cotton involves (1) protection of plants, animals, and man from the harmful effects of pollution; and (2) alleviation of soil, water, and air pollution and disposal of waste. In the past, research efforts have been mainly devoted to developing procedures, equipment, and treatments in textile processing to reduce water pollution. In addition, pollution problems in harvesting and ginning have received attention. In recent years, the problem of byssinosis has become of increasing importance as are chemical residues on plant parts, soil, and fiber. A major effort is being given the problem of byssinosis by Cotton Incorporated. The question of mycotoxins is also under investigation to a certain extent.

A review by the Committee of the 1973 Task Force Report and the priorities established at that time did not dictate changes in the 1973 evaluation of research needs. Some increase in effort is noted but, other than Cotton Incorporated, there did not appear to be any substantial increase in effort on the matter of pollution as revealed through the CRIS system.

Membership

W. E. Garner, Laboratory Director, ARS-USDA, Cotton Ginning Research
Laboratory, Stoneville, Mississippi

Robert J. Harper, Research Leader, ARS-USDA, Southern Regional Research
Center, New Orleans, Louisiana

L. O. Warren, Director, Arkansas Agricultural Experiment Station,
Fayetteville, Arkansas

The first two members were also members of the 1973 Pollution Task Group.

Note: This report does not include research identified as sponsored by Cotton Incorporated.

SUMMARY

<u>Priority</u>	<u>Title</u>	<u>Additional SY's</u> <u>Project</u> <u>Accumulation</u>
<u>1 / 3</u>	Dust Emission and Its Effects on Pulmonary Disorders among Workers in Cotton Mill Operations	5 5
<u>2 / 3</u>	Identification, Control and Elimination of Pollutants Resulting from the Processing of Cotton into Textile Materials	3 8
<u>3 / 3</u>	The Effect of Pesticides Generated by Cotton Production Programs on Air, Soil, and Water Pollution	3.3 11.3
<u>1</u>	Reduction of Hazards to Health and Safety	0.84 12.14

POLLUTION - 1975

Priority 1 / 3

SUBJECT: Dust Emission and Its Effects on Pulmonary Disorders among Workers in Cotton Mill Operations

RPA's: 214, 901

JUSTIFICATION: Dust from cotton has been known as a health factor among textile workers for 250 years. It has been recognized as a probable cause of respiratory ailments for over 100 years. Byssinosis is regarded as being primarily caused by exposure to respirable cotton dust. Exposure may occur during ginning, linters production, textile processing, and other operations where cotton debris is present in the atmosphere.

The Occupational Safety and Health Administration (OSHA) has set a threshold limit value (TLV) in cotton mills of 1 milligram of gross (particles less than 10 micrometers diameter) cotton dust per cubic meter of atmosphere as the standard for compliance. It seems likely that a lower TLV will be recommended in the future. Dust concentrations in some areas of typical mill atmospheres frequently exceed the present standard.

In addition to lint and fuzz, cotton dust contains mineral particles and pieces of plant tissue and microorganisms. Attempts to eliminate dust in mill atmospheres by air filtration have met with little success. A research program is urgently needed to identify specifically the causative agents of byssinosis and to effect their removal. Recent work in this area has suggested a variety of suspect substances: bacterial endotoxins, plant pigments, mycotoxins, proteolytic enzymes, aminopolysaccharide(s), and others. As yet, no single substance has been unequivocally demonstrated as being the cause of byssinosis. Further research is needed to identify the materials present in cotton mill atmospheres which may be responsible for the irritant response observed in byssinotic patients.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	523,107				75,728	598,835
SY's	8.5				2.0	10.5

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>5.0</u>	GRAND TOTAL	<u>15.5</u>
-----------------	------------	-------------	-------------

POLLUTION - 1975

Priority 2 / 3

SUBJECT: Identification, Control, and Elimination of Pollutants Resulting from the Processing of Cotton into Textile Materials

RPA's: 214, 901

JUSTIFICATION: The Clean Water Act of 1966 has focused national attention on textile processing as a major source of environmental pollution. Only the chemical, paper, and food industries have higher total biochemical oxygen demand (BOD) of effluents discharged. The total BOD for the textile industry is estimated at 890 million pounds annually, two-thirds of which arises from desizing, scouring, and mercerizing.

The processing of cotton involves both manipulation of dry fibers and the wet processing of "inprocess" products. Mechanical processing of dry fibers is accompanied by the separation of trash, short fibers, and dust. These materials end up as air pollutants or as disposal problems. The cotton textile industry uses 99 billion gallons of water annually in wet processing. In current practice spun yarns are sized to facilitate weaving. Starch, the most widely used size, places a serious burden upon waterways because of its high BOD level. Scouring and mercerizing operations result in the generation of large quantities of highly alkaline, BOD-laden water. Dyeing, printing, and chemical finishing relating to durable press, flame retardance, or other special properties also constitute major possible sources of water pollution.

The chemical finishing of textiles frequently results in the generation of noxious gases, irritants, and other airborne pollutants. Chemical finishing inherently involves drying and curing at elevated temperatures. Such operations contribute a significant amount of thermal pollution to discharges.

Another problem for the textile industry is noise pollution. Noise levels are particularly high in operations such as opening, cleaning, carding, roving, spinning, and weaving.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	785,308				2,387	787,695
SY's	11.5				.1	11.6

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>3.0</u>	GRAND TOTAL	<u>14.6</u>
-----------------	------------	-------------	-------------

POLLUTION - 1975

Priority 3 / 3

SUBJECT: The Effect of Pesticides Generated by Cotton Production Programs on Air, Soil, and Water Pollution

RPA's: 214, 901

JUSTIFICATION: Cotton receives the most intensive treatment in terms of herbicides, fungicides, insecticides, and defoliants. Insecticides and defoliant applications are made to the above ground portions of the plant. Certain portions of these materials may be washed off onto the soil and into drainage water by rains, but a substantial amount of the materials remain on the leaves and stems. Some of the pesticides may also diffuse into the plant, or be taken up by the plant through its root system.

As harvest approaches, defoliants are applied to strip the leaves from stalks. After harvest, stalks and leaves are turned into the soil. Those pesticides within, or on, the plant residues are thus incorporated into the soil, adding to levels of pesticides already present there.

If a **sizable** portion of applied pesticides remains on the cotton residues and the residues could be disposed of by methods other than plowing under, a substantial reduction of pesticide build-up in the soil might be accomplished.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	148,276			13,973		162,249
SY's	2.3			.4		2.7

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 3.3

GRAND TOTAL 6.0

POLLUTION - 1975

Priority 1

SUBJECT: Reduction of Hazards to Health and Safety

QA: 709

JUSTIFICATION: Research in this area is focused in the mandated national concern for the reduction of hazards to health and safety as affected by the ginning, spinning, and improvement of cotton textiles. Since 1973, considerable resources have been directed toward such problems as 1) developing new methods to evaluate flame retardancy; 2) identification of causative factors of byssinosis in relation to cotton, cotton products, and cotton dusts; 3) new methods, materials, and processes to improve smolder-resistance and flame-retardancy; 4) new and improved methods to remove airborne particulates in all phases of cotton textile production; and 5) evaluation of solvents for smolder-resistance and flame retardancy. Though much progress has been made to bring about reduced health and safety hazards in relation to cotton, the effort must continue to meet the required standards and regulations.

CURRENT STATUS:	ARS	ERS	CSRS	SAES	CI	OTHER	TOTAL
Financial	1,346,198		12,070	2,261		143	1,360,672
SY's	21.14			0.02			21.16

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0.84 GRAND TOTAL 22

Cotton Marketing and Economics Subcommittee Report
to
National Cotton Research Coordinating Committee

Philosophy of Subcommittee

The Agriculture and Consumer Protection Act of 1973 is having a tremendous influence on the domestic cotton and textile industry. The traditional government programs were dropped in favor of a market oriented philosophy. The significance of this and other potential changes is difficult to evaluate because the economic and technical interrelationships within the cotton industry and between it and related sectors are not well documented. Such information is fragmented and incomplete.

In considering the immediate and longer term information needs of both public and private decisionmakers, the Subcommittee concluded that:

1. The development of a reliable, comprehensive bank of information that describes the nature and structure of the industry and documents the input and cost structure from the farm to the consumer is essential.
2. This information, ranging from describing and quantifying current and alternative cultural practices and production systems on farms through the marketing process including grades and standards, market information and the relative use value of cotton in blends with man-made fibers, to needed product development, should provide the understanding for a systematic development of analytical models and also provide a sound basis for re-examining priorities among specific research issues.
3. Such a bank of information and the subsequent development system of models should provide estimates of the impact of changes in such factors as Government policy, technology, or other variables on individual farms and regions and on the structure and performance of the cotton industry and related sectors.
4. In addition to the program outlined here, economists can make a valuable contribution to the total cotton and cottonseed research effort by fully participating in interdisciplinary teams. The increasing complexities of research areas and broad implications of adjustments to change require a combination of research talents to be most effective.

Membership

The research program reviewed by the Subcommittee covers seven RPA's and 26 researchers were involved in developing its benchmark report to the committee in 1972. Resources did not allow such a thorough approach to the current effort. Instead one or more researchers from each of the earlier RPA

task forces reviewed and updated their previous recommendations. Their current recommendations were then reviewed and in some instances slightly modified by Amos D. Jones, ERS, USDA; and Robert Firch, University of Arizona, both members of the original Subcommittee, and J. F. Hudson, Louisiana State University.

SUMMARY

<u>Priority</u>	<u>Title</u>	<u>Project</u>	<u>Additional SY's</u> <u>Accumulation</u>
<u>RPA 501 Grades and Standards</u>			
<u>1 / 5</u>	Non-lint content and Lint Color	2.0	2.0
<u>2 / 5</u>	Instrumentation for Measuring Fiber Properties for Processing Efficiency	1.8	3.8
<u>3 / 5</u>	Measurement of Factors Affecting Cotton-Seed Quality	1.5	5.3
<u>4 / 5</u>	Cotton Classification System Utilizing Instrument Measurement of Fiber Properties	0	5.3
<u>5 / 5</u>	New Quality Factors Affecting the Value of Cotton	0	5.3
<u>RPA 503 Efficiency in Supply Production Inputs for Cotton and Marketing Cotton and Cotton Seed</u>			
<u>1 / 6</u>	Improve Technology for Ginning, Handling, and Storing Cotton	2.0	2.0
<u>2 / 6</u>	Pricing Seed Cotton for Extended Ginning	1.9	3.9
<u>3 / 6</u>	Cost of Ginning, Handling, and Storing Cotton	0	3.9
<u>4 / 6</u>	Feasibility of Quality Determinations on Cotton Being Made on One Sample Drawn Automatically during Ginning	2.0	5.9
<u>5 / 6</u>	Relationships between Cost, Volume, Mill Size and Type to Crush Cottonseed	1.0	6.9
<u>6 / 6</u>	Domestic and Foreign Systems of Contracting for U. S. Cotton or Cotton Acreage	0	6.9
<u>RPA 506 Cotton Supply, Demand, and Price Analysis</u>			
<u>1 / 1</u>	Supply, Demand, and Price Analysis for Cotton and Cottonseed	0	0

<u>Priority</u>	<u>Title</u>	<u>Project</u>	<u>Additional SY's</u> <u>Accumulation</u>
<u>RPA 507 Competitive Interrelationships</u> <u>in the Cotton Sector</u>			
<u>1 / 3</u>	Organization and Interrelationships of the Cotton and Textile Industry	4.9	4.9
<u>2 / 3</u>	Factors Affecting Production Costs of Cotton	0	4.9
<u>3 / 3</u>	Interrelationships of Resources Used to Produce and Market Cotton	2.6	7.5
<u>RPA 509 Performance of Marketing Systems</u> <u>for Cotton</u>			
<u>1 / 3</u>	Effectiveness of Existing and Alternative Marketing Systems in Servicing and Developing Cotton Markets	3.0	3.0
<u>2 / 3</u>	Market Structure Relationships to Cost and Margins in Marketing and Utilization of Cotton and Cottonseed	1.5	4.5
<u>3 / 3</u>	Development of Improved Market Information System	1.0	5.5
<u>RPA 601 Foreign Market Development for</u> <u>Cotton</u>			
<u>1 / 5</u>	Cotton Marketing Systems of Other Cotton Producing Countries	2.0	2.0
<u>2 / 5</u>	Changes in the Economy of Foreign Production Countries That Affect Cotton Production	1.0	3.0
<u>3 / 5</u>	Textile Economies of Cotton Importing Countries and Their Impact on the Demand for U. S. Cotton	1.0	4.0
<u>4 / 5</u>	Factors Influencing Our Share of Foreign Markets	1.5	5.5
<u>5 / 5</u>	Evaluation of Fiber Properties of Foreign Cottons	0.5	6.0

<u>Priority</u>	<u>Title</u>	<u>Project</u>	<u>Additional SY's</u> <u>Accumulation</u>
	<u>RPA 808 Government Programs to Balance</u> <u>Farm Output with Market Demand</u>		
<u>1 / 1</u>	Government Programs and Policies Affecting Cotton	2.9	2.9
	GRAND TOTAL		34.1

GRADES AND STANDARDS - 1975

Priority 1 / 5

SUBJECT: Non-Lint Content and Lint Color

RPA: 501

JUSTIFICATION: Color is a major factor in cotton quality but its measurement is influenced by the presence or absence of foreign matter, which can mask the true color. The problem of developing a rapid method of removing foreign matter from the sample (including such fibrous material as motes) and determining its weight in relation to the sample as an integral part of the color determination has not been solved. There is urgent need for research to develop an accurate and rapid trash or foreign matter measurement to supplement other instrument measurements currently being evaluated in classing offices.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	30,000					30,000
SY's	.5					.5

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>2.0</u>	GRAND TOTAL	<u>2.5</u>
-----------------	------------	-------------	------------

REMARKS: Research should be a joint effort of ARS, AMS, and ERS. ARS has recently initiated work in this area.

GRADES AND STANDARDS - 1975

Priority 2 / 5

SUBJECT: Instrumentation for Measuring Fiber Properties for Processing Efficiency

RPA: 501

JUSTIFICATION: Research and development has resulted in a series of first-generation instruments that will measure length, strength, and fineness in a sample of cotton. There is some indication that the length-strength instruments may not possess the degree of repeatability or of accuracy that is desired. Further research is needed to improve current methods of preparing specimen lint for length and strength measurements, and to refine the present instruments to make them more efficient in terms of repeatability, in time required to evaluate a sample, and study operation of the instruments in a classification environment.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	133,811			26,014	4,211	164,036
SY's	1.2			0.8		2.0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 1.8 GRAND TOTAL 3.8

REMARKS: ARS, AMS, and ERS have agreed to pursue this subject starting in 1976. A three to five year program is needed. The additional SY's should include 1.0 from ARS and 0.8 from ERS.

GRADES AND STANDARDS - 1975

Priority 3 / 5

SUBJECT: Measurement of Factors Affecting Cottonseed Quality

RPA: 501

JUSTIFICATION: Cottonseed (especially high moisture seed) is subject to deterioration in quality and loss in value through fungi and other contamination, normal metabolic changes, and instability of its oil constituents when exposed to the atmosphere. To maintain quality, more information is needed on the environmental factors which influence these changes during handling, storage, transportation, and processing. Also to insure improved uniform and standardized products in the marketing channels, new, more rapid and improved methods for measuring quality factors need to be developed for use in inspection, grading, and standardized programs.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	33,397					33,397
SY's	0.5					0.5

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 1.5 GRAND TOTAL 2.0

REMARKS: The first priorities should be to (a) develop a simple, rapid, and inexpensive method of grading cottonseed for use at the gin level for trading between producer and ginner (b) and to develop equipment and methods for rapid accurate measurement of the quantity of oil in cottonseed.

GRADES AND STANDARDS - 1975

Priority 4 / 5

SUBJECT: Cotton Classification System Utilizing Instrument Measurement of Fiber Properties

RPA: 501

JUSTIFICATION: The present classification system, which is based on grade, staple length, and micronaire reading is not adequate for determining the relative value of cotton. There is a need, using instrument measurements of all important fiber properties, (a) to develop precise relative values that reflect the true technical use values of cotton with different fiber properties; and (b) to use these values to establish a classification system based on instrument measurements of fiber properties that will assist producers, marketing firms and processors in determining value and in communicating current and projected demand.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	157,343	43,427				200,770
SY's	1.5	.8				2.3

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0 GRAND TOTAL 2.3

REMARKS: This is a continuing joint research effort that should be maintained at about the current level of resources.

GRADES AND STANDARDS - 1975

Priority 5 / 5

SUBJECT: New Quality Factors Affecting the Value of Cotton

RPA: 501

JUSTIFICATION: Many fiber technologists are convinced that present measures used in evaluating cotton quality are not the only ones that may be important. All variations in spinning cannot be explained by differences in length or length uniformity, strength, fineness, grade, color, and manufacturing variations. There is a continuing need to identify and measure new cotton fiber properties that contribute to spinability and relative value.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	103,819					103,819
SY's	1.2					1.2

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0

GRAND TOTAL 1.2

REMARKS: A multidisciplinary team effort on a continuing basis, analyzing both cotton and cotton blends, will be required to be effective.

MARKETING EFFICIENCY

Priority 1 / 6

SUBJECT: Improve Technology for Ginning, Handling, and Storing Cotton

RPA: 503

JUSTIFICATION: Great strides have been made in the design of machinery for cotton ginning, handling, and storing; but continued pressure from faster harvesting dictates that even more efficient ginning methods and equipment be developed that reduce losses, better utilize available labor and preserve the quality of the fiber. Also, some gin owners have begun to centralize gins and erect storage facilities at gin sites in competition with the traditional ginning-storage sector. Moreover, many ginners and farmers, because of economic necessity, have begun a system of gin- and on-field-storage of seed cotton. The effect of these changes upon the efficiency of the overall marketing system should be analyzed.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial			130,000	61,873		191,873
SY's			2.0	1.7		3.7

ESTIMATED RESEARCH NEEDS:

ADDITIONAL 2.0 GRAND TOTAL 5.7

REMARKS: This should be a continuous program of technology assessment with greater emphasis on economic implications to the public and private sectors.

MARKETING EFFICIENCY

Priority 2 / 6

SUBJECT: Pricing Seed Cotton for Extended Ginning

RPA: 503

JUSTIFICATION: Under the present marketing system, a sample of ginned lint is used to determine value per bale of all cotton produced. At the peak of the season, gins often cannot stay up and farmers are therefore denied revenue from the cotton which is still in seed cotton form. Although the U. S. Department of Agriculture, in 1971, inaugurated a seed cotton loan program to assist the cotton industry, the problem remains because it is not yet possible to accurately determine the quality, and thus value, of the lint for loan or sales purposes. In order to alleviate this problem and to further encourage a program of seed cotton storage which enables gins to operate for longer periods of time thereby reducing the cost of ginning, efforts should be made to develop an accurate system of seed cotton pricing.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial				12,549		12,549
SY's				0.1		0.1

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 1.9 GRAND TOTAL 2.0

REMARKS: AMS, USDA is responsible for cotton grades and standards and should be involved in this research.

MARKETING EFFICIENCY

Priority 3 / 6

SUBJECT: Cost of Ginning, Handling, and Storing Cotton

RPA: 503

JUSTIFICATION: The present ginning, storage, and handling system is one of the most inefficient steps in the marketing of U.S. cotton. Even though the number of ginning establishments has continued to decrease, excess capacity continues to plague the industry. The high cost of excess capacity and inefficient use of facilities in the movement of cotton from farm to market greatly increases the total marketing bill. There is a need to (a) development information on the current industry cost and practices for ginning, compressing, and storing cotton; (b) determine cost and breakeven values for various size plants; (c) estimate charges needed to maintain adequate levels of ginning and storage capacity; (d) reduce the cost of handling and storing seed cotton, lint and trash; and (e) evaluate the economic impact of merger on cotton gins and predict economic outcome.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	187,336	231,802	100,000	26,331		545,469
SY's	1.7	6.4	1.6	.5		10.2

ESTIMATED RESEARCH NEEDS:

ADDITIONAL 0

GRAND TOTAL 10.2

REMARKS: ERS is substantially reducing resources to determine ginning and warehousing costs. Emphasis should be shifted to the problems associated with trash disposal, the cost of related facilities and equipment, and the impact of current and proposed environmental regulations upon the ginning sector.

MARKETING EFFICIENCY

Priority 4 / 6

SUBJECT: Feasibility of Quality Determinations on Cotton being Made on the Sample Drawn Automatically during Ginning.

RPA: 503

JUSTIFICATION: Traditionally, American cotton bales have been sampled by cutting through the bagging with a knife. Each sample consists of a segment from each side of the bale. Furthermore, the bale is usually resampled each time ownership changes, resulting in cuts between a number of bands in a large proportion of the bales. The general appearance of American bales has long been a source of criticism from foreign as well as domestic mills. Equipment for sampling bales during ginning has been available for about 20 years and subsequent improvements have been made. To achieve the full benefit of automatic sampling, trading practices need to be altered so that quality determinations, made on the basis of the gin sample, are acceptable at all subsequent stages of marketing.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial						0
SY's						0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>2.0</u>	GRAND TOTAL	<u>2.0</u>
-----------------	------------	-------------	------------

REMARKS: The ability of newer type automatic samplers used in conjunction with high capacity gins need to first be evaluated to determine their reliability to accurately reflect grade and staple of the bale from which it has been taken. Samples and bales need to be stored under a variety of conditions for specific periods to adequately evaluate the sample's value or representativeness of the bale at later stages in the marketing system.

MARKETING EFFICIENCY

Priority 5 / 6

SUBJECT: Relationships between Cost, Volume, Mill Size and Type to Crush Cottonseed

RPA: 503

JUSTIFICATION: Inefficiencies in crushing, both from the standpoint of cost and product yields, have a depressing effect on seed prices to growers or product prices to consumers. To provide guidelines for improvement, there is a need: (a) to develop information on current cost of crushing cottonseed; (b) establish relationships of costs to volume crushed for different size mills; (c) determine the extent of variation in yield, if any, for different type mills; and (d) establish indices of variations for such mill types.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial						0
SY's						0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.0</u>	GRAND TOTAL	<u>1.0</u>
-----------------	------------	-------------	------------

REMARKS: Very little is known about the structure or performance of this industry.

MARKETING EFFICIENCY

Priority 6 / 6

SUBJECT: Domestic and Foreign Systems of Contracting for U. S. Cotton or Cotton Acreage

RPA: 503

JUSTIFICATION: Prior to 1972, forward contracting for cotton and/or cotton acreage was a minor activity with little total impact on the marketing of the basic cotton supply. Now contracting has become widely prevalent with most, if not all, major domestic fabric mills and significant foreign interests participating. Although some descriptive research has been completed, there remains a need to assess the effectiveness of present organizational methods of handling contracts, and to recommend modifications in the domestic and foreign contracting system and structure that appear advisable in the long-run interests of U. S. cotton producers and the domestic cotton industry.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial				64,627		64,627
SY's				1.2		1.2

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0</u>	GRAND TOTAL	<u>1.2</u>
-----------------	----------	-------------	------------

REMARKS:

COTTON SUPPLY, DEMAND, AND PRICE ANALYSIS - 1975

Priority 1 / 1

SUBJECT: Supply, Demand, and Price Analysis for Cotton and Cottonseed

RPA: 506

JUSTIFICATION: With more reliance on the market and less government involvement in cotton support, the problem of quantifying economic factors affecting the supply and demand for cotton and cottonseed becomes more critical. Small firms, farmers, and consumers do not have the resources for such analyses. Thus, public economic research must provide continuous appraisal of the current and prospective economic position of cotton and cottonseed to cotton producers, to a large segment of the supporting industries, and other private and public decisionmakers.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial		259,729	287,190	47,194		594,113
SY's		3.6	4.5	0.5		8.6

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>0</u>	GRAND TOTAL	<u>8.6</u>
-----------------	----------	-------------	------------

REMARKS:

COMPETITIVE INTERRELATIONSHIPS IN THE COTTON SECTOR - 1975

Priority 1 / 3

SUBJECT: Organization and Interrelationships of the Cotton and Textile Industry

RPA: 507

JUSTIFICATION: Even though considerable research has been devoted to the individual components of cotton production, processing, and marketing, no clear description of the entire industry and the relationship of the components has been undertaken. Adjustments within one segment of the industry have often been made with little or no understanding of the impact of these adjustments on other segments of the cotton industry. There is a critical need for a systematic effort to assemble, relate, and maintain current information on the cotton lint and cottonseed industry.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial		107,898		15,033		122,931
SY's		2.1		0		2.1

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>4.9</u>	GRAND TOTAL	<u>7.0</u>
-----------------	------------	-------------	------------

REMARKS: ERS, USDA is increasing its resources to the suggested level in 1976/77. Resources will be reduced in 1978/79 to a continuing maintenance level of about 3.0 SY's.

COMPETITIVE INTERRELATIONSHIPS IN THE COTTON SECTOR - 1975

Priority 2 / 3

SUBJECT: Factors Affecting Production Costs of Cotton - 1975

RPA: 507

JUSTIFICATION: Since a Congressional mandate in 1964, the Economic Research Service, USDA, has been engaged in determining the costs of growing cotton by regions in the United States. Congress again stressed the need for this information in the Agriculture and Consumer Protection Act of 1973. A vital part of this research is to develop annual estimates of regional and national inputs and the effect of changes in inputs, prices, and yields on production costs.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial		110,259				110,259
SY's		1.4				1.4

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0

GRAND TOTAL 1.4

REMARKS: Resource requirements will increase significantly every fourth or fifth year when a complete new national survey is required to develop benchmark information.

COMPETITIVE INTERRELATIONSHIPS IN THE COTTON SECTOR - 1975

Priority 3 / 3

SUBJECT: Interrelationships of Resources Used to Produce and Market Cotton

RPA: 507

JUSTIFICATION: Changes in input costs such as labor and machinery, alternative crop yields and expected prices for alternative crops will have an impact on the competitive position of cotton within and among producing regions. Public and private decisionmakers need to know the effect of (a) changing costs of input items and marketing costs on crop mixes and farm income within and among production regions, (b) changing price relationships between commodities on cotton production and crop mixes within and among production regions, and (c) the aggregate impact of these changes on the cotton industry and related industry groups and the competitive relationships among cotton producing regions.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial		45,000		14,649		59,649
SY's		1.0		0.4		1.4

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>2.6</u>	GRAND TOTAL	<u>4.0</u>
-----------------	------------	-------------	------------

REMARKS: The Firm Enterprise Data System (FEDS) developed by ERS, USDA, in cooperation with Oklahoma State University and maintained at Oklahoma State University in cooperation with participating States could be a vital tool in this research. A greater, well coordinated, input from the States would be desirable in keeping these budgets accurate and current.

PERFORMANCE OF MARKETING SYSTEMS FOR COTTON - 1975

Priority 1 / 3

SUBJECT: Effectiveness of Existing and Alternative Marketing Systems in Servicing and Developing Cotton Markets

RPA: 509

JUSTIFICATION: Two factors are requiring a reassessment of the marketing structure for cotton. First are the changes in the national farm legislation for cotton. Second is the need for more effective cotton marketing organization to combat the inroads of manmade fibers in the total U. S. fabric market. Unless an improved marketing program and supporting organizational structure are devised, cotton could become a low-volume luxury fabric comparable to silk today. The reassessment should determine the critical marketing functions a cotton marketing system must provide or improve if cotton is to be competitive in the total fiber market, and ascertain the effective marketing organization alternatives that would enable achievement of the critical marketing functions for cotton.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial				15,033		15,033
SY's				0		0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>3.0</u>	GRAND TOTAL	<u>3.0</u>
-----------------	------------	-------------	------------

REMARKS: This research should be completed within 2 years and compliment the systems analysis outlined under RPA 507.

PERFORMANCE OF MARKETING SYSTEMS FOR COTTON - 1975

Priority 2 / 3

SUBJECT: Market Structure Relationships to Cost and Margins in Marketing and Utilization of Cotton and Cottonseed

RPA: 509

JUSTIFICATION: Changes in marketing structures and practices affect costs and margins both within the system for cotton, cottonseed and their products, and among other economic sectors. The measurement and analysis of the marketing margins and costs over time provide insights into opportunities for possible further adjustments to improve overall performance through additional modifications in the marketing systems, and provide a basis for analyzing cotton policy and program alternatives.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial						0
SY's						0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.5</u>	GRAND TOTAL	<u>1.5</u>
-----------------	------------	-------------	------------

REMARKS: Initially some basic methodology research will be needed to develop a means of analyzing cotton in multi-fiber products and markets.

PERFORMANCE OF MARKETING SYSTEMS FOR COTTON - 1975

Priority 3 / 3

SUBJECT: Development of Improved Market Information System

RPA: 509

JUSTIFICATION: Unlike its synthetic competitors, cotton suffers from inadequate knowledge of market requirements in planning production, processing, and distribution strategies. Independent decisions made at each of the production-marketing-processor levels may result in poor overall performance and costly mistakes that affect each industry participant. Information systems designed to quickly and accurately transmit quality, quantity, price, the contents and scope of contracting, and delivery signals would enable the cotton industry to more closely approximate the envious market performance of man-made fiber suppliers.

CURRENT STATUS:	ARS	ERS	CI	SAFS	OTHER	TOTAL
Financial						0
SY's						0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>1.0</u>	GRAND TOTAL	<u>1.0</u>
-----------------	------------	-------------	------------

REMARKS: The market information system for cotton has improved in recent years but is still in need of refinement. Suration should not exceed 2 years.

FOREIGN MARKET DEVELOPMENT FOR COTTON - 1975

Priority 1 / 5

SUBJECT: Cotton Marketing Systems of Other Cotton Producing Countries

RPA: 601

JUSTIFICATION: Some cotton producing countries have markedly different methods of grading, preparing for export, and merchandising cotton. There is need to develop information and cost data on countries' cotton marketing systems as a basis for determining if the efficiency of our own system could be improved. Data on efficiency of marketing systems would be developed from data on prices paid farmers, prices to central markets, export sales prices, and shipping rates to world markets.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial						0
SY's						0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>2.0</u>	GRAND TOTAL	<u>2.0</u>
-----------------	------------	-------------	------------

REMARKS: Once the major foreign exporting systems have been determined and the cost structure quantified, the resources could be reduced to the 1.0 SY level for monitoring and updating previous analyses.

FOREIGN MARKET DEVELOPMENT FOR COTTON - 1975

Priority 2 / 5

SUBJECT: Changes in the Economy of Foreign Production Countries That Affect Cotton Production

RPA: 601

JUSTIFICATION: Foreign cotton production has made rapid strides and foreign cottons now represent about three-fourths of the cotton moving in international trade. Planning for United States' cotton markets, therefore, must take into account prospective changes in foreign cotton production. This calls for as detailed knowledge as possible of the factors influencing cotton production in foreign countries to anticipate forthcoming changes and to evaluate the impact of such changes upon the export market for United States cotton.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial				4,153		4,153
SY's				0.1		0.1

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 1.0

GRAND TOTAL 1.1

REMARKS: This should be a continuing assessment by FAS and ERS, USDA; and selected industry organizations.

FOREIGN MARKET DEVELOPMENT FOR COTTON - 1975

Priority 3 / 5

SUBJECT: Textile Economies of Cotton Importing Countries and Their Impact on the Demand for United States Cotton

RPA: 601

JUSTIFICATION: The fiercest competition faced by U. S. cotton undoubtedly is in importing countries. In some of the traditional markets for U. S. cotton, such as Western Europe, more and more of the textile market is being taken by rapidly increasing cotton textile imports from developing countries. Very often the imports are from cotton producing countries that are selling yarn, fabrics, and made-up goods made of their own cotton, thus replacing U. S. and other cottons formerly spun and woven in the importing countries. The economic and political factors determining how these markets are shared now, and are likely to be shared in the future, must be determined.

CURRENT STATUS:	ARS	FRS	CI	SAES	OTHER	TOTAL
Financial						0
SY's						0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL	<u>1.0</u>	GRAND TOTAL	<u>1.0</u>
------------	------------	-------------	------------

REMARKS: This research should be coordinated with market development and intelligence activities of FAS, USDA, Cotton Incorporated; Cotton Council International; and the International Institute for Cotton. It was not possible to delineate and quantify these agencies' resources devoted to this subject.

FOREIGN MARKET DEVELOPMENT FOR COTTON - 1975

Priority 4 / 5

SUBJECT: Factors Influencing Our Share of Foreign Markets

RPA: 601

JUSTIFICATION: There have been prolonged periods when cotton produced in particular countries has appeared to be experiencing growing popularity in the aggregate or in particular markets while other countries' cotton exports were declining. The increasing importance of some foreign cottons in international trade raises the question of whether they are merchandised in a way that gives them a competitive advantage over U. S. cotton and whether other factors are involved. Research is needed to identify business practices and economic and political factors that are associated with the market share prospects for U. S. and specific foreign cottons especially in important hard currency areas.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial				1,343		1,343
SY's				0		0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 1.5 GRAND TOTAL 1.5

REMARKS: This research should be coordinated with market development and intelligence activities of FAS, USDA; Cotton Incorporated; Cotton Council International; and the International Institute for Cotton. It was not possible to delineate and quantify these agencies' resources devoted to this subject.

FOREIGN MARKET DEVELOPMENT FOR COTTON - 1975

Priority 5 / 5

SUBJECT: Evaluation of Fiber Properties of Foreign Cottons

RPA: 601

JUSTIFICATION: The quality of cotton produced in any given country can undergo considerable change because of weather conditions, insect attacks, and other causes. Over a period of years significant changes can develop because of shifts in varieties, and improved technology generally. Those concerned with the exportation of U. S. cotton can do a more effective job of selling if they have up-to-date information on the fiber properties of the cottons with which U. S. cotton must compete. This calls for continuing studies to determine the fiber properties of foreign cottons and evaluation of their competitive strengths and weaknesses compared to domestic cottons.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial						0
SY's						0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 0.5 GRAND TOTAL 0.5

REMARKS: A cooperative effort between FAS and AMS, USDA appears most desirable. This type of information, formerly assembled by FAS, has not been available for a number of years.

GOVERNMENT PROGRAMS TO BALANCE FARM OUTPUT
WITH
MARKET DEMAND - 1975

Priority 1 / 1

SUBJECT: Government Programs and Policies Affecting Cotton

RFA: 808

JUSTIFICATION: The cotton industry has operated for many years under Government programs featuring production controls, price support payments, and various land diversion and conservation plans. The impact of these forces coupled with competition from man-made fibers and foreign-grown cotton, and changing market outlets abroad for cotton is being felt by all segments of the cotton industry. Changing conditions emphasize the continuing need for economic analyses and information to guide policy decisions and industry planning. There is a need to identify and evaluate the immediate impacts of Government program alternatives (including no program) and major questions also center around the longer-term effects of program and policy changes, technology, changes in domestic and export market conditions, and devaluation of the dollar on the competitive position of U. S. cotton.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial		77,369		8,451		85,820
SY's		0.9		0.2		1.1

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.9 GRAND TOTAL 4.0

REMARKS: This research needs to be well coordinated so that regional analyses may be meaningfully aggregated.

Cotton Utilization Subcommittee Report
to
National Cotton Research Coordinating Committee

Philosophy of Subcommittee

The Utilization Subcommittee met in New Orleans, Louisiana, where it discussed research needs for cotton within its area of responsibility. Resource material included: the 1973 National Cotton Research Task Force report, a CRIS printout of cotton research, the current 1976 ARS program, and the 1975 research budget for Cotton Incorporated.

In considering a program for utilization research, it was agreed that:

a. Cotton as an agricultural commodity faces powerful competition from man-made fibers produced by a few giant chemical corporations which provide a total research and marketing effort for their products many times that of the cotton industry. As a result, it behooves both private and public cotton interests to make every possible effort to cooperate in the effective use of the limited research and marketing funds available to them.

b. Cotton consumption in the United States appears to have stemmed the steady decline of the past fifteen years and leveled off at around 30 percent of the total fiber market. This has been in part a result of growing recognition of cotton's good qualities by consumers, and in part a result of increased marketing and merchandizing effort by cotton growers much of which is based on past research. If cotton is to regain lost markets, the reservoir of research must be continually replenished.

c. In view of increasing energy costs and stringent EPA and OSHA regulations, increased efforts must be made to maintain competitive manufacturing costs for cotton products. At the same time a strong program must be continued to provide cotton products with the broad range of essential functional and aesthetic properties demanded by consumers.

Membership

Mr. Hal E. Brockmann, Cotton Incorporated, Raleigh, North Carolina

Dr. Mary E. Carter, ARS, US Department of Agriculture, New Orleans,
Louisiana

Mr. Nelson F. Getchell, ARS, US Department of Agriculture, Beltsville,
Maryland

SUMMARY - COTTON UTILIZATION

<u>PRIORITY</u>	<u>TITLE</u>	<u>ACCUMULATIVE TOTAL</u>
1	Mill Processing of Cotton Fiber	15.0
1	Conversion of Cotton into Yarn and Fabrics	17.4
1	Conversion of Fabrics to Finished Goods	11.4
1	Development of Consumer Properties and Products, Easy Care	19.9
1	Development of Consumer Properties and Products, Fire Retardancy	42.8
2	Development of Consumer Properties and Products, Testing and Evaluation	15.6

COTTON UTILIZATION 1975/76

Priority 1 /

SUBJECT: Mill Processing of Cotton Fiber

RPA: 407

JUSTIFICATION: Man made staple fibers arrive at the textile mill door clean, white and uniform in length. Ginned cotton as received by the mill contains varying amounts of plant trash, fine dust, and short tangled fibers which must be separated and removed with minimum damage to length uniformity, all of which represents a serious competitive cost disadvantage for cotton. Dust generated in cleaning and mechanical processing, particularly the respirable fraction which is the object of strict OSHA standards, represents the single most serious problem facing cotton today. Fine dust is also recognized as a major difficulty for cotton in open-end spinning. A serious need also exists for further automation and streamlining of cotton preparatory equipment and processes together with maintenance of fiber quality needed for conventional and developing spinning systems. The assessment of fiber properties and their effects on ring and open-end spinning has been partially completed, but further study is needed to fully exploit newly developing technology such as "no twist" and electrostatic spinning.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
SY's	11.5		3.5			15.0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>3</u>	GRAND TOTAL	<u>18</u>
-----------------	----------	-------------	-----------

REMARKS: Detail data on current projects attached.

MILL PROCESSING OF COTTON FIBER

<u>SUBTITLE</u>	<u>ORGANIZATION</u>	<u>ACCESSION #</u>	<u>WU/PROJ. #</u>	<u>75/76 SY'S*</u>
Fiber Prep. Equip. Dev.	CI		73-273	.8
Fiber Prep. Equip. Dev.	CI		71-223	.5
Open End Spinning Studies- Fiber Properties	ARS	0041940	7102-15720-008	2.4
" " " "	ARS	0042533	7102-15720-009	1.7
" " " "	ARS	0042956	7102-15720-011	2.5
" " " "	CI		74-285 + IH	1.8
Fiber Properties and Proc.	CI		73-641	.4
Dust Removal-Electrostatic	ARS	0040962	7102-15390-002	3.9
Dust, Cotton Processing	ARS	0040982	7708-15390-002	1.0
				<hr/> 15.0

*Cotton Incorporated data based on fiscal '75
(considered more representative).

COTTON UTILIZATION 1975/76

Priority 1 /

SUBJECT: Conversion of Cotton into Yarn and Fabrics

RPA: 407

JUSTIFICATION: All man-made fibers are initially produced as continuous filaments, and compete for textile markets as either staple fiber or filament yarns. Filament fibers bypass the costly fiber preparation and spinning operations necessary to staple yarn production, and provide the textile manufacturer with yarns ready for knitting and weaving. By texturizing filament yarns to achieve the cover and appearance of staple fiber fabrics, synthetic fiber manufacturers hope eventually to take over the remaining apparel and household markets now served by 100 percent cotton fabrics and blends. In 1975 700 million pounds of textured filament polyester went into double knits, and the use of textured filament yarns in weaving is increasing. This threat to the entire staple fiber spinning industry provides urgent incentive for research to develop lower cost alternatives to conventional ring spinning. Open end, no twist, and electrostatic methods for staple yarn production promise the increased productivity needed for cotton to compete with man-made filament synthetics.

Cotton has not participated equitably in the tremendous double knit expansion of the past few years. Improvement in yarn properties, modification of knitting machines to accomodate cotton, and studies to improve quality of knitted cottons has high research priority. Synthetic fibers using spun bonded techniques are capturing markets formerly held by linters and cotton waste. Research to regain these markets in wet and dry forming systems for non-woven products is important.

CURRENT:	ARS	ERS	CI	SAES	OTHER	TOTAL
SY's	7.0		10.4			17.4

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 3

GRAND TOTAL 20.4

REMARKS: Detail data on current projects attached.

CONVERSION OF COTTON INTO YARN AND FABRIC

<u>SUBTITLE</u>	<u>ORGANIZATION</u>	<u>ACCESSION #</u>	<u>WU/PROJ. #</u>	<u>75/76 SY'S</u> *
Knit Textile Research	CI		IH	2.5
Dispersible Fiber - Wet Lay	CI		71-516	.8
New Products - Home Furn.	CI		IH	.8
Fabric Development - Commercial	CI		IH	6.3
Knitting Efficiency - Yarns	ARS	0041320	7102-15740-003	3.3
Electrostatic Spinning Systems	ARS	0041939	7102-15720-008	3.7
				<hr/> 17.4

* Cotton Incorporated data based on fiscal '75
(considered more representative).

COTTON UTILIZATION 1975/76

Priority 1 /

SUBJECT: Conversion of Fabrics to Finished Goods

RPA: 407

JUSTIFICATION: Preparation of cotton fabric for dyeing and finishing involves use of enormous quantities of water with attendant problems of stream pollution from removal of warp size and natural non-cellulosic constituents. Also because of cotton's high water holding capacity and the present need to wet and dry the fabric several times during preparation, dyeing and finishing, very large amounts of energy, much of it in the form of natural gas, are required. Research aimed at reducing pollution and energy use in wet processing will significantly benefit cotton. New, streamlined methods and equipment for dyeing and finishing of cotton textiles, particularly for handling of tubular knit fabrics are urgently needed to maintain cotton's competitive position relative to filament polyester products. These include development of solvent and vapor phase processes as alternatives to conventional aqueous systems, as well as methods to apply dyes and chemicals at reduced water pickup.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
SY's	7.6		3.8			11.4

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u>10</u>	GRAND TOTAL	<u>21.4</u>
-----------------	-----------	-------------	-------------

REMARKS: Detail data on current projects attached.

CONVERSION OF FABRICS INTO FINISHED GOODS 1975/76

<u>SUBTITLE</u>	<u>ORGANIZATION</u>	<u>ACCESSION #</u>	<u>WU/PROJ. #</u>	<u>75/76 SY'S</u> [*]
Factors in Shrinkage and Shape - Knits	ARS	0042739	7102-15740-004	2.0
Reactive Cottons as Substrates	ARS	0041393	7102-15730-022	2.2
Preparation, Dyeing and Printing	CI		75-296	1.6
Multicolor Cotton	CI		74-526	.3
Swell-Stretch Preparation for DP	CI		74-4-IH	.3
Pretreatments for DP	CI		IH	1.3
Improved Knit Finishes	CI		IH	.3
Finishing Tech-Cotton	ARS	0040139	7102-14960-001	1.0
Liquid NH3 - Merc	ARS	0041383	7102-14960-004	2.4
				<hr/> 11.4

* Cotton Incorporated data based on fiscal '75 (considered more representative).

COTTON UTILIZATION

Priority 1 /

SUBJECT: Development of Consumer Properties and Products, Easy Care

RPA: 407

JUSTIFICATION: The term "easy care" encompasses a number of important aesthetic and functional qualities--shape, crease, and smoothness retention after laundering, resistance to wrinkling and mussing during wear, and elimination of shrinkage. Variously known as durable press, no-iron, wash and wear, these properties are vital in most apparel and many household uses. Good progress has been made in developing all cotton DP for botton-weight fabrics and increasing the cotton content of light-weight blends used in men's shirts. However, 1005 polyester and high polyester bland fabrics continue to dominate a majority of durable press products because of the loss in strength and abrasion resistance suffered by all-cotton fabrics at high levels of cross-linking. A major technical breakthrough in this problem would do more than any other single development to recapture lost markets for cotton. It is likely that such a breakthrough will occur only as a result of a better understanding of underlying fundamentals of fiber structure and crosslinking.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
SY's	17.3		2.6			19.9

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u> - </u>	GRAND TOTAL	<u> 19.9 </u>
-----------------	--------------------------	-------------	-----------------------------

REMARKS: Detail data on current projects attached.

DEVELOPMENT OF CONSUMER PROPERTIES AND PRODUCTS, EASY CARE 1975/76

<u>SUBTITLE</u>	<u>ORGANIZATION</u>	<u>ACCESSION #</u>	<u>WU/PROJ. #</u>	<u>75/76 SY¹s*</u>
Addition Complexes of Cross-linked for DP	ARS	0041319	7102-15730-024	2.0
DP Cotton with OE Yarn	ARS	0041941	7102-15730-023	1.7
Home Creasable DP	ARS	0041942	7102-15730-025	2.4
Optimum DP Cotton Blends	ARS	0041943	7102-15730-026	3.2
Low Odor Formaldehyde Agents for Blends	ARS	0041392	7102-15730-021	2.3
Pad-Vapor-Set (P-10.11) Commercialization	CI		75-305	2.0
New Products and Process Evaluation	CI		IH	.4
Wet-Fix Commercialization	CI		74-209	.2
Graft Polymer Reactions	ARS	0042868	7102-15730-030	2.0
New Polymers for DP, etc.	ARS	004884	7102-15730-019	3.7
				<hr/> 19.9

* Cotton Incorporated data based on fiscal '75
(considered more representative).

COTTON UTILIZATION

Priority 1 /

SUBJECT: Development of Consumer Properties and Products, Fire Retardancy

RPA's: 407, 705

JUSTIFICATION: A general apparel flammability standard has been proposed by the National Bureau of Standards to the Consumer Product Safety Commission in February, 1976. The impact of this if implemented will be that all or most all cotton containing apparel fabrics will require some level of flame retarding in order to be sold commercially. The work that has been accomplished in the past has established an important benchmark in that it has been demonstrated that cotton can be effectively treated to meet even the most stringent Federal and commercial standards. Isolating the required processes and levels of add-on to meet the new proposed standards must be executed. Optimization and better understanding of existing fire retardant systems is important. The search for lower cost and/or more cost effectiveness in the flame retardancy must be sought. Fire retardants are required that will resist the effect of chlorine and peroxide bleaches in both home and commercial laundering. The toxicity of fire retardant fabrics both to skin and the products of combustion to inhalation must be ascertained. Combining of flame retardant treatments with other important consumer properties such as comfort and durable press is much to be desired.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
SY's	33.3		8.8	0.7		42.8

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's -

GRAND TOTAL 42.8

REMARKS: Detail data on current projects attached.

DEVELOPMENT OF CONSUMER PROPERTIES AND PRODUCTS, FIRE RETARDANCY 1975/76

<u>SUBTITLE</u>	<u>ORGANIZATION</u>	<u>ACCESSION #</u>	<u>WU/PROJ. #</u>	<u>75/76 SY'S</u> *
Cigarette-Resist Batting	CI		73-258	1.7
FR W/Phosphorus and Organo Sulfur/n	ARS	0040329	7102-14560-007	2.8
Effect of Location of FR on Retardance	ARS	0040905	7102-14560-015	1.0
Morphology of Cotton-FR	ARS	0040904	7102-14560-014	1.0
Phosphorus-Halogen Agents and Dyes - FR	ARS	0040903	7102-14560-013	3.9
FR-Home and Recreational Use	ARS	0041938	7102-15710-006	2.3
FR Systems Commerciali- zation	CI		75-9-IH	1.0
New FR Chem. Research	CI		IH	3.5
Commercializing New FR Chem.	CI		IH	.8
FR Product and Process Appraisal	CI		IH	.3
Combustion Products - Toxicity	CI			.8
FR Data Research - Burning Properties	CI		73-554	.7
Factors Affecting Flamma.	UC(SAES)		CA-D-CSC-3324-MH	.3
Selected Fabrics W/FR Fin.	LSU(SAES)		LAEC1584	.4
Emulsions-FR	ARS	0040946	7102-14560-016	1.0
Phosphorus-Bomine FR	ARS	0041904	7102-14560-017	2.3
Smoldering-Solvent Syst.	ARS	0041905	7102-14560-018	0.4
Smoldering - Furniture	ARS	0041906	7102-14560-019	1.7
Smoldering-Thermo Analyt.	ARS	0041907	7102-14560-020	1.8
Surface Chem. - FR	ARS	0042485	7102-14560-021	1.8

* Cotton Incorporated data based on fiscal '75
(considered more representative).

FIRE RETARDANCY (Continued):

<u>SUBTITLE</u>	<u>ORGANIZATION</u>	<u>ACCESSION #</u>	<u>WU/PROJ. #</u>	<u>75/76 SY'S</u> [*]
Combustion Rate-FR	ARS	0042486	7102-14560-022	2.3
Bleach-THPOH/NH ₃	ARS	0042538	7102-14560-023	2.0
Low CH ₂ O - FR	ARS	0042697	7102-14560-024	4.0
Soil and Bleach - FR	ARS	0042751	7102-14560-025	3.0
Pyrolysis Prod. - FR	ARS	0042787	7102-14560-026	2.0
				<hr/> 42.8

* Cotton Incorporated data based on fiscal '75
(considered more representative).

COTTON UTILIZATION 1975/76

Priority 2 /

SUBJECT: Development of Consumer Properties and Products, Testing and Evaluation

RPA: 407

JUSTIFICATION: A very broad range of functional qualities are needed to satisfy consumer demands in hundred of different products. Many of these can be achieved through chemical finishing. Frequently, study programs are required to assess generic factors relating to cotton. Among these are the study of the inherent comfort characteristics, the factors contributing to the comfort sensation and its measurement. With such data, a benchmark is achieved against which evaluation of competitive products can be made. Broader studies of fiber morphology and crystalline structure are required to understand how chemical and mechanical processes can usefully modify the fiber. Extensive wear testing is often required to prove the relative merit of a new finish to determine the useful service life compared to standard commercial products. Such studies, over the past three years, have demonstrated that bottomweight, 100% cotton can be effectively durable press treated to give a better than average useful service life because of improved appearance, color retention and shrinkage control. Existing test methods and standards should be examined carefully for bias against natural fiber products, and relationship to actual use.

CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
SY's	13.1		2.5			15.6

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's	<u> - </u>	GRAND TOTAL	<u> 15.6 </u>
-----------------	----------------------	-------------	-------------------------

REMARKS: Detail data on current projects attached.

DEVELOPMENT OF CONSUMER PROPERTIES AND PRODUCTS, TESTING AND EVALUATION

<u>SUBTITLE</u>	<u>ORGANIZATION</u>	<u>ACCESSION #</u>	<u>WU/PROJ. #</u>	<u>75/76 SY's</u> [*]
Comfort Prop. of Cotton and Blends	ARS	0040177	7102-15730-004	1.5
Comfort Evaluations	CI		75-304	.8
Product Use Evaluations (Wear Tests)	CI		73-262	1.7
Free Radical Reactions	ARS	0040908	7102-15730-018	5.0
Relation of Ultra- structure to Physical Prop.	ARS	0040964	7102-15730-020	1.3
Structure-Secondary Wall	ARS	0042639	7102-15730-028	1.0
Outdoor Cotton Fabrics	ARS	0040325	7102-15710-003	1.3
Germicidal Finishes	ARS	0041937	7102-15730-005	1.0
Improved Wear	ARS	0042738	7102-15730-027	2.0
				<hr/> 15.6

^{*} Cotton Incorporated data based on fiscal '75
(considered more representative).

Cottonseed Utilization Subcommittee Report
to
National Cotton Research Coordinating Committee

Philosophy of Subcommittee

Utilization research needs for cottonseed were discussed by telephone and/or in person with participants and each was asked to contribute. Resource materials included: the 1973 National Cotton Research Task Force report, a CRIS printout of cottonseed research, the current 1976 ARS program, the 1975 research budget for Cotton Incorporated, and the 1975 recommendations of the National Cottonseed Products Association Task Force on Food and Industrial Protein.

In considering a program, the utilization research proposed identified only the highest priority problems and does not cover the recognized total research needs. It is recommended that significant progress be achieved in these identified areas.

a. Although the production of cottonseed is linked biologically to the production of cotton fiber, cottonseed is more than a mere by-product. Cottonseed is now recognized as an essential segment of the food and feed supplies of the nation and the world that provide for people and animals. This important seed product can go far in providing us with an economically viable source of food and feed.

b. The cottonseed crushing industry is at present undergoing both consolidation and vertical integration. The factors, other than good normal business practices directing this movement, include: (a) the dependence of volume of seed on cotton lint production; (b) the need for prompt crude oil refining to overcome seasonally dependent oil color problems; (c) the identification of accessible, direct markets for oil and protein products that provide greater return than that obtained from crude oil and meal; and, most importantly, (d) the need for new processing technology to minimize energy consumption and to meet OSHA and EPA regulations on the elimination of occupational hazards and abatement of pollution.

c. An attractive market for cottonseed protein in terms of need potential and return is edible protein products. The food industry continues its interest in vegetable proteins for the following reasons: To extend and complement present animal protein supplies; the lower cost per unit of protein via vegetable; and the marketability of nutritious products in a convenient form. The presence of gossypol and the lack of appropriate methods for its removal have been the chief deterrents to the utilization of cottonseed protein products in the food chain. The preparation of gossypol-free products from glanded varieties by the use of the liquid cyclone and the development of glandless varieties free of gossypol are two major breakthroughs which can have tremendous impact on the economics of cottonseed utilization.

d. Inherent in the development of new food and feed products is the responsibility to determine the nutrient composition and content as well as the physical, functional, and sensory properties of the products. Another important responsibility is the need to protect the raw material and its products from environmental contaminants through identification of the type source of the contaminant and development of methods for their elimination.

Participants

Mary E. Carter, SRRC, New Orleans, Louisiana

W. H. Schuller, SRRC, New Orleans, Louisiana

G. M. Jividen, Cotton Incorporated, Raleigh, North Carolina

R. J. Hron, Sr., SRRC, New Orleans, Louisiana

F. G. Dollear, SRRC, New Orleans, Louisiana

Wilda H. Martinez, NPS, Beltsville, Maryland

A. M. Cowan, NPS, Beltsville, Maryland

SUMMARY - COTTONSEED UTILIZATION

<u>Priority</u>	<u>Title</u>	<u>Additional SY's</u> <u>Project</u>	<u>Accumulation</u>
1	Develop Technology to Eliminate or Inactivate Mycotoxins in Contaminated Cottonseed Products	5.5	5.5
1	*Develop Ecologically and Economically Acceptable Processes without Decreasing Yield and Protein Quality	0	5.5
1	Develop Suitable Sterilization Methods for Cottonseed Protein Products	0	5.5
2	Develop Alternate Economically and Commercially Feasible Processes for the Preparation of Cottonseed Protein Products.	2.6	8.1

* Contract - Texas A&M

COTTONSEED UTILIZATION - 1976

Priority 1 /

SUBJECT: Develop Technology to Eliminate or Inactivate Mycotoxins in Contaminated Cottonseed Products

RPA: 702

JUSTIFICATION: No cotton producing area is free from the possible occurrence of aflatoxin or other mycotoxins in cottonseed and its products. A problem of aflatoxin contamination occurs most frequently in Arizona and the Imperial Valley, Ca. The elimination or inactivation of mycotoxin is necessary in order for the seed to enter the feed and food system in any product form. In addition, extensive feeding studies will also be required to establish and ensure animal and human safety levels.

*CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	257,950	0	50,000			307,950
SY's	5.5	0	-			5.5

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.5 GRANT TOTAL 8.0

REMARKS:

*
FY '76 estimated

COTTONSEED UTILIZATION - 1976

Priority 1 /

SUBJECT: Develop Ecologically and Economically Acceptable Processes without Decreasing Yield and Protein

RPA's: 406, 407

JUSTIFICATION: Traditionally, seed processing operations have produced crude oil, meal, hulls, and linters. Processing operations for today and for the future will be required to meet OSHA and EPA regulations. These changes plus the age of many of the oil mill operations, and the increasing cost of energy, all contribute to the increasing need for development of radically new procedures for oilseed processing. In this light a review should be made of seed cleaning, acid delinting or enzymatic delinting, new methods of hull removal, and new methods of separating oil and protein. In addition, we can no longer continue our present utilization or disposal of by-products such as motes, field trash, gossypol as we have in the past. Processes must be sought which are less energy consuming and which provide for better utilization of these by-products.

*CURRENT STATUS:	**ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	42,000	0	100,000			142,000
SY's	0	0	-			0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 3.0

GRAND TOTAL 3.0

REMARKS:

*
FY 1976 Estimated

**
Contract at Texas A&M

COTTONSEED UTILIZATION - 1976

Priority 1 /

SUBJECT: Develop Suitable Sterilization Methods for Cottonseed Protein Products

RPA: 702

JUSTIFICATION: There are many ways to kill bacteria and fungi that might contaminate food and feed products. The problem remains, however, of how to kill the harmful organisms without destroying the nutritive value, digestibility, functionality, and acceptability of the protein product. Common sterilization techniques cannot be used because the protein is "sensitive" to most of these techniques and is easily denatured or adversely modified. If suitable method(s) were available, then the industry could more easily produce products with an acceptable microbial profile for food and feed needs.

*CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	0	0				0
SY's	0	0				0

ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 2.5 GRAND TOTAL 2.5

REMARKS:

*
FY 1976 Estimated

COTTONSEED UTILIZATION - 1976

Priority 2 /

SUBJECT: Develop Alternate Economically and Commercially Feasible Processes for the Preparation of Cottonseed Protein Products

RPA's: 406, 407

JUSTIFICATION: The Liquid Cyclone Process is a development which will produce a high quality protein flour, oil and a ruminant feed. The required capital investment and the lack of a reliable seed supply of an economically sufficient size could limit the widespread adoption of this process. Thus, it would seem desirable to explore other separation techniques for gossypol pigment glands that would be more attractive to the cottonseed industry. Some requirements for a "feasible" process should include systems that are economically attractive at any production level and capital investment, as well as being minimally labor intensive. Only by impacts of this nature will progress be made toward full utilization of the cottonseed protein and products.

* CURRENT STATUS:	ARS	ERS	CI	SAES	OTHER	TOTAL
Financial	76,405	0	40,000			116,405
SY's	2.6	0	-			2.6

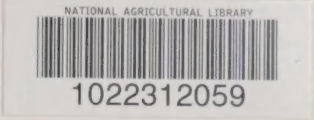
ESTIMATED RESEARCH NEEDS:

ADDITIONAL SY's 3.0

GRAND TOTAL 5.6

REMARKS:

* FY 1976 Estimated



or

NATIONAL AGRICULTURAL LIBRARY

1022312059